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UNIVERSITY OF ALBERTA

CULTURAL FORMATION PROCESSES AT FORT DUNVEGAN, NORTHWEST ALBERTA: A ZOOARCHAEOLOGICAL AND HISTORIC DOCUMENTARY APPROACH

BY

ELIZABETH H. MANN ©

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of MASTER OF ARTS.

DEPARTMENT OF ANTHROPOLOGY

Edmonton, Alberta
Fall, 1991

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled CULTURAL FORMATION PROCESSES AT FORT DUNVEGAN, NORTHWEST ALBERTA: A ZOOARCHAEOLOGICAL AND HISTORIC DOCUMENTARY APPROACH submitted by ELIZABETH H. MANN in partial fulfillment of the requirements for the degree of MASTER OF ARTS.

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Date: 10 Oct. 1991

ABSTRACT

The aim of this thesis is to identify certain cultural behaviours which may have affected the formation of the faunal assemblage from the historic fur trade fort of Dunvegan (1805-1878), located on the north shore of the Peace River in northwestern Alberta. The emphasis is on past subsistence activities and patterns, particularly those activities involved in obtaining and processing wild game.

Historic journals from Fort Dunvegan and a number of faunal assemblages from the site were available for analysis. Utilizing three hypotheses established from the documentary data and testing them against the archaeological data, specific continuities and discontinuities between recorded behaviour and the behaviour inferred from the archaeological record were identified. Specifically, it was found that the faunal remains did not clearly reflect trading practices which took place at Fort Dunvegan. However, the remains did reflect the subsistence base of the personnel at the Fort. The rank ordering of the species utilized, based on the Fort journals, coincided with the results from the archaeological remains. However, the faunal remains did not accurately reflect true quantities (MNI) of species used for human consumption.

In addition, matrix samples obtained from the site of Fort Dunvegan were fine-screened to test whether small bones were missed when utilizing only a 1/4 inch mesh screen size. It was found that recovery techniques showed no appreciable difference in this instance, and it was recommended that fine-screening may not always be necessary at all sites.

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CHAPTER ONE
INTRODUCTION

INTRODUCTION

This thesis is about formation processes of archaeological sites, in particular cultural formation processes. Its aim is to identify and isolate certain behaviours, particularly in terms of animal food procurement, which may have affected the formation of the faunal assemblage from the historic fur trade fort of Dunvegan, located along the Peace River in northwestern Alberta. The emphasis is on specific subsistence activities, notably those activities involved in obtaining and processing food as part of an active cultural system.

Prager (1980) conducted a similar type of study on fur trade artifacts. She attempted to determine what processes were involved "in the transfer of items from an ongoing cultural system to their subsequent depositional context" (1980:1). Comparing historic inventory lists with actual archaeological artifact assemblages from two fur trade posts in Alberta, Prager was able to examine the accuracy of the archaeological record. This study will be similar to Prager's, but will emphasize the zooarchaeological evidence and the documentary data concerning subsistence activities, rather than the material culture.

The identification of cultural factors that influence the creation of a zooarchaeological assemblage is necessary, in order that accurate and realistic interpretations may be made from the assemblage. However, a gap in knowledge exists in fully understanding these processes. It is essential to determine the processes that have operated through time on a particular assemblage, so that the number of assumptions can be minimized while maximizing the reliability of the interpretations that can be made. Schiffer (1983:697) has emphasized this point:

> When any archaeological inference is put forth, the investigator has inevitably made assumptions, usually tacit ones, about the nature of formation processes. These assumptions frequently assert that formation processes have slight effects or have random effects that cancel out each other. More than a decade of work on formation processes has shown, however, that these and similar assumptions are wrong and dangerous. Inappropriate assumptions must be replaced by thoughtful efforts to understand how specific deposits formed.

Historic archaeology can make a valuable contribution towards identifying certain formation processes, because of the availability of an additional source of information, namely the data obtained from historic documents. Fort Dunvegan was chosen for specific analysis because of its well-documented history. It was occupied from 1805 to 1878 -- nearly 75 years, except for a period of three years when it was closed (1825-1828). Numerous historic journals, which span many of the years of occupation at the Fort, provide the primary base of documentation regarding procurement activities and the processing of food at the site. The available historical data, along with an extensive archaeological faunal assemblage, make Fort Dunvegan an ideal site for studying the problem of identifying cultural formation processes with reference to past subsistence activities.

In this thesis, the information relating to actual behaviours (activities) determined from the historic documents will be compared with the results of the analysis of a faunal assemblage from the site. Specific continuities and discontinuities between recorded behaviour and the behaviour inferred from the archaeological record will then be identified. The emphasis, therefore, is on determining the degree of consistency between the archaeological record and the historical record. Because of this, it is important to discuss the validity and reliablility of both of these two sources of data. It is well known that the archaeological record is not perfect; likewise, the "historical document does not necessarily contain more truth than the artifacts recovered from the ground" (Ferguson 1968:7). These two sources of data simply represent "different analogs of human behaviour"(Ferguson 1968:7) and one is neither better nor worse than the other. In reality, both records of human behaviour have their limitations and these must be considered during analysis. In the following anaylses, specific problems will be identified and will be taken into consideration during the interpretive stages of this study.

This study is important, because it emphasizes the significance of the contribution that historic archaeology can make in generating and testing new theories. Schiffer (1987:8) stated that historic archaeology is just one of a number of new fields of research which can contribute new theories. Finally, it is suggested that future faunal analyses could pursue a new direction. Rather than having research on historic sites be a "...virtual desert when it comes to containing more than a sprig or two of anthropologically oriented research..." (South 1977:12), faunal analysts could pursue "...soundly based research that may be meaningful in an archaeological context"(Williams 1978:34). Consequently, by utilizing a faunal assemblage from an historic site, anthropological and methodological contributions can be made towards archaeology as a whole.

THEORETICAL BACKGROUND

Site formation theory

A consideration of the development of site formation theory as it applies to this thesis is necessary before an analysis of specific cultural formation processes is conducted. Michael Schiffer is the primary proponent of site formation theory, and the following is a discussion of its fundamental elements.

Some archaeologists believe that certain forms of behaviour can be determined through the analysis of material remains. However, as Williams (1978:41) has warned,"...archaeologists should be cognizant of the number of complex variables which may bias an assemblage, even before the initial stroke of the trowel." The majority of these complex variables can be grouped under various formation processes of the archaeological record. Schiffer (1983:675)) has stated that the study of formation processes is essential: "...for unless the genesis of deposits is understood, one cannot infer the behaviors of interest from artifact patterns in those deposits." Presumably these processes cause variability in archaeological deposits, and may include the destruction or modification of patterns and/or materials, the creation of new patterns, or the addition of new materials (Schiffer 1983:678).

Schiffer (1987) has identified two basic kinds of formation processes: cultural and non-cultural, or natural processes. Cultural processes, which are also known as c-transforms, are processes that involve human behaviour. With reference to the zooarchaeological record, human behaviour could include butchering techniques, hunting patterns, processing food, and refuse disposal (Williams 1978:35). Natural processes, or n-transforms, are processes that come from the physical environment, or from other actions which do not involve humans. They can include decay, weathering, and disturbance by animals (Schiffer 1987:22).

The primary emphasis of this thesis is on c-transforms, specifically hunting patterns and the processing of food, and their influences on the zooarchaeological record. The procurement of food for the population at Fort Dunvegan has undoubtedly left patterns in the zooarchaeological record, and it is this patterning which is of interest. Data obtained from the historic documents, when compared to the zooarchaeological data, should help elucidate what types of cultural formation processes may have taken place. Natural formation processes have also certainly occurred at the site, both during occupation and after abandonment. They can include disturbance of refuse by carnivores, such as domesticated dogs owned by the Fort residents, and disturbance due to agricultural activities after the site was abandoned. Accordingly, n-transforms will also be considered in this thesis, but to a much lesser degree.

Artifacts can be found in either systemic or archaeological context at any particular time. Those artifacts which are being used in the cultural system are in systemic (behavioural) context. Once those artifacts are discarded or lost and "interact only with the natural environment" (Schiffer 1987:4), they form part of the archaeological record. It is particularly important to determine how artifacts are utilized in systemic context, before they enter archaeological context, as this will determine what state the artifacts will be in. In this thesis, the historic documents will help to clarify how zooarchaeological remains are dealt with in systemic context. Procurement activities such as how an animal is butchered, which animal parts are brought to the Fort to be consumed, which animal parts are discarded, and other refuse disposal patterns at the site, will help to clarify the information obtained from archaeological context.

A significant concept of Schiffer's, but one which other researchers do not wholly agree with, is the "transformation" view. This position states that: "...as a result of formation processes, the archaeological record is a transformed or distorted view of artifacts as they once participated in a behavioral system ..." (Schiffer 1987:10). One implication of this transformation view is that "regardless of how much evidence is present, the archaeologist cannot read behavior and organization directly from patterns discovered in the archaeological record" (Schiffer 1987:10). However, because formation processes produce patterning, thorough knowledge of those processes allows more control and accurate interpretation of the archaeological record. One belief of particular importance to this thesis is that the wide variety and number of formation processes limit the number and kind of inferences that can be drawn from the archaeological record.

Lewis Binford, however, contests the above view with regard to certain points concerning the limitations of the archaeological record. In particular, Binford believes that the archaeological record is not distorted by formation processes. For example, one claim of the 'new archaeology' was that archaeologists do not know everything there is to know about archaeological sites, including "all the sources of variability contributing to the archaeological record" (Binford 1983a:239). Therefore archaeologists often do not know exactly what to infer about the archaeological record (Binford 1983e:214). Furthermore, Binford has stated that "...it is premature to offer an a priori evaluation as to the 'limitations' of the archaeological record for yielding up information" (1983a:239).

In addition, he feels that all statements made about the archaeological record are only inferences, and thus the degree of preservation of a site or assemblage should not be considered limiting when making interpretations. In other words, the"facts do not speak for themselves" (Binford 1983a:232). Binford further argued that the inferences made by archaeologists about the past are only as good as their understanding of what has gone on in the past, and how they make sense of those material results.

Binford does not agree with the opinion that formation processes cause distortions in the archaeological record. Central to this discussion is the difference between Binford's and Schiffer's concept of what a cultural system is. In Binford's view:

> A cultural system is not a summation of all the events, behaviors, or other transactional phenomena going on at a given time, but rather the conditioning organization framework within which all these events transpire. (Binford 1983a:235)

Binford feels that knowledge of cultural systems is important, and the aim should not be to "generate set pieces of descriptive history" (Binford 1983a:231). Instead of determining palaeoethnographies, it is essential to be more general and attempt to determine the overall aspects of cultural systems -- the basic framework instead of the small details. This last point is particularly significant because many sites consist of palimpsests, and therefore information concerning one single occupation may be extremely difficult to obtain. For Binford, individual behaviours that took place on a particular site at a specific time are unimportant (Binford 1983a:231). Rather, it is the general system of dynamics over time which are important; these dynamics may result in patterns of material remains about which the archaeologist can then attempt to make inferences.

According to Binford, all behavioural activities that take place at a site are part of an overall cultural system (Binford 1983a:231). On the other hand, Schiffer stated that a site should represent all behavioural activities, and if these activities are not readily apparent, then the site is distorted or biased due to either other behavioural activities (c-transforms), or the natural environment (n-transforms). Binford's view can be summarized as follows:

> ...if one considers the maintenance of life-space part of the cultural system, the act of cleaning up and disposal itself as a part of the cultural system, even the presence of a dump as a component of the cultural system, how are things distorted? *Answer: they are not distorted.* What is distorted is Schiffer's view of a cultural system, and his ideas as to how to understand one. (Binford 1983a:236; emphasis in original)

In other words, Binford stated that Schiffer has pre-existing expectations of what the archaeological assemblage should be like. Binford called these pre-existing expectations the "Pompeii premise", as Schiffer wants to find perfectly preserved sites like Pompeii:

> Raising objections that the archaeological record may be "biased" seems to stem from some strange expectation that the archaeological record is some kind of fossilized picture remaining to us from the past with built-in and self-evident meanings upon which "times arrow" has played disturbing tricks ... All meanings come from us. (Binford 1983b:24)

Binford agreed with Schiffer with reference to the possible disturbing actions of n-transforms on the archaeological record; however, Binford did not see c-transforms as being distorting actions. The idea is that any activities (or behaviours) which take place within a cultural system, and which may modify certain aspects of materials deposited, are merely part of an ongoing and active system. These activities are perfectly natural, and are not anomalies which should be considered distorting or disturbing to what previously was there.

The fact is that the archaeological record is never perfect. In seeking perfect sites, one is only apt to become disappointed: "Holding up the Pompeii premise as an ideal 'insures that the imperfect world of "dirt archaeology" will almost always be a frustrating one." (Binford 1983a:240). Instead of holding unrealistic expectations, it would be more profitable to seek to understand the archaeological record as it is (Binford 1983a:240).

SUMMARY

In summary, according to Schiffer c-transforms or cultural behaviours may distort an archaeological site and its related assemblages. On the other hand, while Binford agreed that certain n-transforms can affect a site, he feels that all behaviors are part of an overall cultural system and certain behaviours should not be singled out as being "distorting".

A better perspective is perhaps a middle ground between the two perspectives. Cultural formation processes need to be understood and identified with regard to each and every site. The point is not necessarily to consider them as biasing or distorting processes, because inherent in that view is the belief that there should be an ideal situation. Instead, it would be more productive to determine what behaviours may have taken place within a cultural system, in order that the inferences made from the material remains may be more accurate. For example, inaccurate inferences will be avoided once one is made aware that certain cultural activities can affect and alter evidence from previous activities. It is thus advantageous and beneficial to attempt to identify cultural formation processes, because without them false or misleading inferences may be made.

To achieve these objectives, this thesis will be structured as follows. Chapter Two will present the environmental setting and historical background of the site of Fort Dunvegan. Chapter Three will present the documentary research, the methods, and the results of the attempt to discover cultural formation processes. This will primarily include three hypotheses that have been formulated from the historic documents concerning the topic of subsistence practices. Chapter Four will include archaeological information, and interpretations of the results from the excavations and the analysis of the faunal assemblage. It will also include an experiment with fine-screen sieving of matrix samples from the site. A comparison of the historical data with the archaeological data will be made in Chapter Five. This comparison will help clarify the continuities and discontinuities between the written record and the archaeological record. General conclusions will also be presented in Chapter Five, and they will involve an evaluation of the research. A final discussion of the two types of data (archaeological and historical), and their integration, will be conducted. Also, a discussion of the results on a broader scale, particularly in terms of ramifications for research involving other historic and prehistoric faunal assemblages, will be made in this final chapter.

CHAPTER TWO

FORT DUNVEGAN - HISTORY AND ENVIRONMENTAL CONTEXT

INTRODUCTION

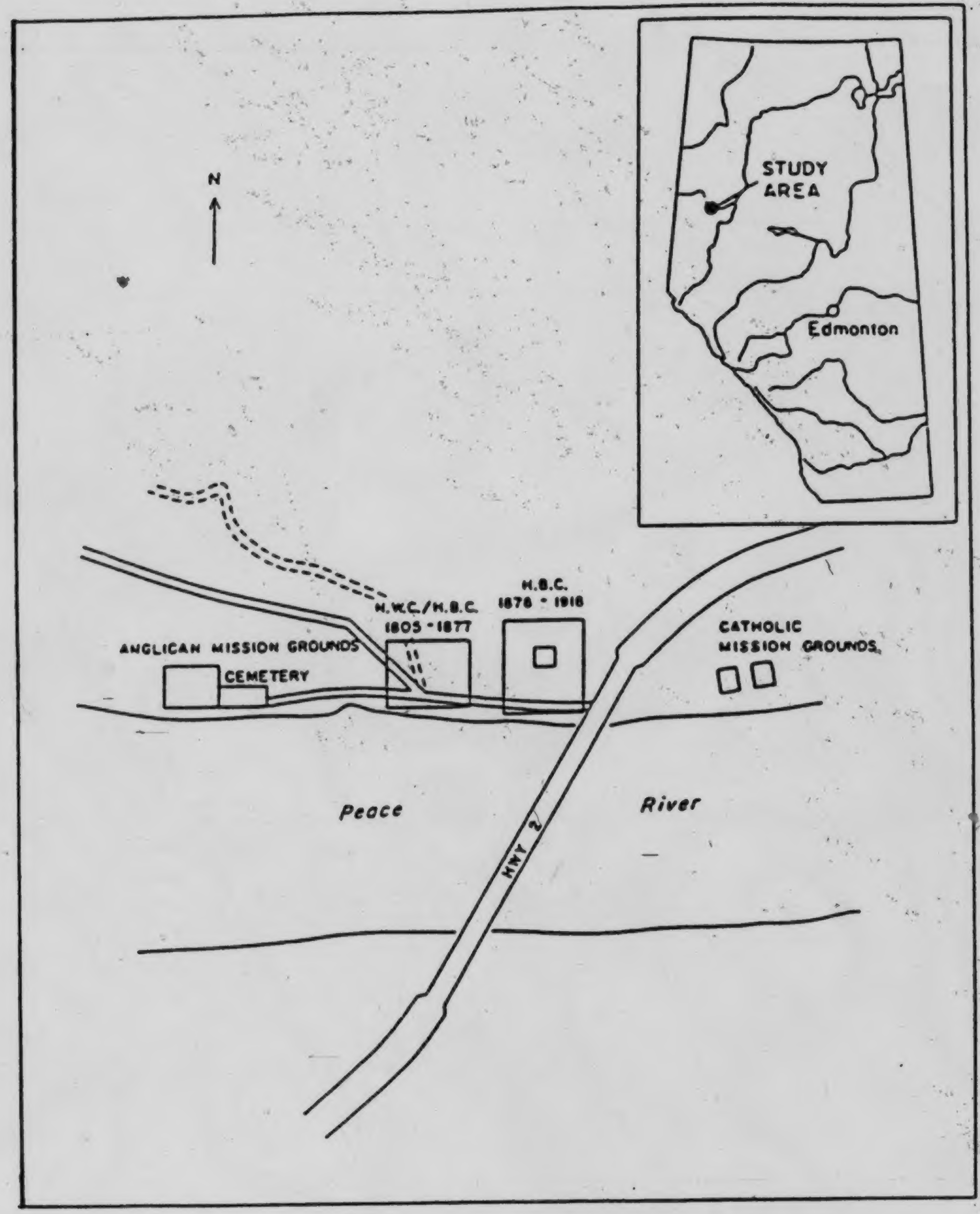
As a northern post, Dunvegan was chosen for analysis because subsistence was based on country food to a much greater degree than the more southern posts. This occurred because of the relative isolation of northern posts and the high cost of transportation of goods to such distant locations. However, Fort Dunvegan was not a single isolated fort; rather, it was part of a far larger context of the fur trade in western Canada. It is therefore important to determine which forts Dunvegan would have had contact with, besides discussing the history of Fort Dunvegan specifically. One of the reasons for determining these histories is that the forts of one company in a region were interdependent, and they relied on each other if they were short of supplies. This reliance included the possibility of obtaining provisions when poor circumstances made it necessary. Placing Fort Dunvegan and other forts into their historical context of the Peace River region is accordingly useful.

Determination of the physical environment in which Fort Dunvegan was located will also help place it into context. For example, the climate, the topography, and the local vegetation are significantly interrelated (see Williams 1978:14) and were instrumental in the successful functioning of the Fort. The physical environment influenced the distribution and abundance of certain animal species, which in turn affected the maintenance of the Fort. This is with reference to what animals were available for subsistence and trapping for the fur trade. The fact that the Fort was able to remain in operation for nearly one hundred years is remarkable. One has to question whether there were specific environmental features which enabled Fort Dunvegan to remain in operation in one locale for such a long period of time. To illustrate, one has to wonder if the animal population was adequate to sustain the Fort's population for the whole period of occupation, or whether the Fort had to rely on other sources of food such as imports, expensive as they were.

Because the trade was with local Native groups, it is also important to determine which groups were in the vicinity, their distribution, as well as the more distant groups that also had contact with the Fort. This situation has implications involving the amount and type of furs brought into the Fort to trade, and whether fresh or dried meat was also traded (amongst other factors). Boreal forest economic patterns of these Native groups, classified generally as the subarctic indians, will be discussed. Due to the difficult and unreliable nature of the subarctic environment, it was necessary for the Natives to develop specific adaptations in order to survive. With this in mind, the personnel at the fur trade posts in this environment had to develop certain adaptations. An overview of how these inhabitants, particularly those at Fort Dunvegan, adapted and obtained provisions within a difficult situation will be included in this chapter. Finally, economic zonation and foraging strategies theory will be presented. It will be applied to historic documentary data in Chapter Three. Greater knowledge and insight concerning the clarification of subsistence strategies within a northern environment will therefore be provided.

ENVIRONMENTAL CONTEXT

Fort Dunvegan is located on the north bank of the Peace River, approximately 92 kilometers west of the meeting point of the Peace and Smoky Rivers (Holmgren 1984:175), (Figure 2.1). In 1887, Arthur Robertson visited Fort Dunvegan, and gave the following description of it: "Fort Dunvegan is beatifully situated...standing in a hollow amid steep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CATHOLIC MISSION GROUNDS
Peace
River
HWY 2

Figure 2.1. Location of historic sites at Dunvegan, Alberta.
(from Pyszczyk and Smith 1985:2)

Plate 2.1 The site of Fort Dunvegan. Note the flat alluvial plain which is now used for a market garden. (Photo: ASA)

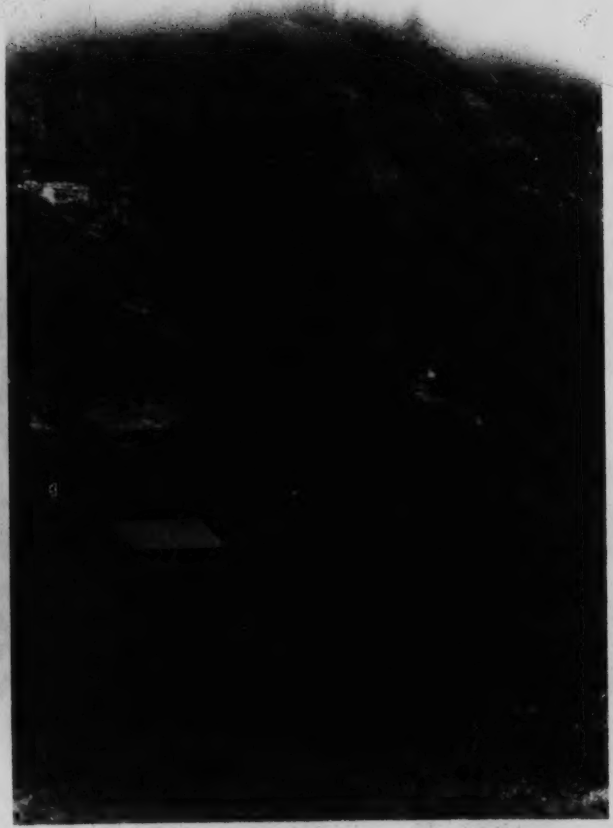


Plate 2.2 The steep hills rising behind Fort Dunvegan. (Photo: ASA)

hills which rise to the height of 700 or 800 feet almost immediately from its enclosures" (Robertson 1985:21). The "steep hills" mentioned here are characteristic of the Peace River valley system, although the hills can vary from gradual slopes to steep cliffs throughout the extent of the river valley. There are points along the river, at the base of the valley, where there are flat terraces (Plates 2.1 and 2.2). Fort Dunvegan is located on such a terrace, "approximately 15 to 20 meters above the bank of the Peace River " (Pyszczyk 1983:22). Soils of these alluvial terraces can be quite fertile.

Fort Dunvegan's environment is surprisingly not straightforward to identify. The results of a review of literature find that, depending on the source consulted, the site could be located in environments such as: grassland, prairie, parkland prairie, parkland, boreal forest (mixedwood region), and boreal mixedwood (dry mixedwood subregion). Part of the problem is the fact that the topography of the local area is quite diverse. The Fort is located in a valley system, and the vegetation in the valley can be different from above on the prairie level. In addition, the north and south banks of the valley have vastly different vegetation patterns, due primarily to differing amounts of exposure to solar radiation. As Oke (1987:175) has stated:

> ...the naturally uneven configuration of the landscape produces a wide spectrum of microclimates, and these have implications for other aspects of the physical environment. Plant and animal habitats are affected, thereby leading to distinctly different assemblages of flora and fauna on slopes of different angle and aspect.

Any type of discussion of the local or regional environment actually has a broad frame of reference, and does not take the valleys into consideration. While the differences between the valley and the prairie above is not dramatically different at Fort Dunvegan, minor differences do exist. For example, Oke (1987:178) has stated that temperatures in valleys may be cooler at night: "At night the valley surfaces cool by the emission of long-wave radiation. The lower air layers cool and slide down-slope under the influence of gravity." This colder and denser air then settles in the bottom of the valley, producing cooler temperatures.

In addition, a valley can be more protected from poor weather such as high winds or blizzards. Moreover, the valley walls, especially the south-facing wall, can act as reflectors of solar radiation and reflect heat into the valley, making it a more comforatable place to live.

An early description of the region also mentions the local environment and the differences in the valleys. In 1879, George Dawson wrote a report on the Peace River region of Alberta and British Columbia after exploring it, and stated that the area close to Fort Dunvegan consisted of prairie:

> West of the Smoky River, both to the south and north of Peace River, there are extensive areas of prairie country, either preferably open and covered with a more or less luxuriant growth of grass, or dotted with patches of coppice and trees. (Dawson 1879:114)

Dawson noted that there was a difference between the Peace River valley and the area above it. Within the valley, he stated that the northern slopes were grassed, while the "remainder of the surface" was composed of mixed deciduous and coniferous trees. "Some patches of the original forest, however, remain, particularly in the river valleys, and are composed of much larger trees, chiefly coniferous, among which the black spruce is most abundant." (Dawson 1879:114). He made a very noteworthy point when he explained the origin of the prairies in the Peace River region. As he stated:

> There can be no doubt that they have been produced and maintained by fires. The country is a naturally wooded one, and where fires have not run for a few years, young trees begin rapidly to spring up. The fires are, of course, ultimately attributable to human agency, and it is probable that before the country was inhabited by the Indians it was everywhere densely forest-clad. (1879:115)

The point about the role of fire is a significant one, and the fact that man may have had an influence in shaping the local environment is indeed interesting. Lewis (1982) has discussed indepth the ecology of fire, and has found that there are numerous beneficial results of burning certain areas or regions. For example, one of the results of a fire includes the removal of dead plants and "a more rapid warming of the soil" (Lewis 1982:28) due to its dark-coloured surface. This facilitates the earlier growth of plants and results in a longer growing season. Game is also attracted to regions where new growth is available after removal of the mature forest.

More recent analyses of the local environment can be found in Dawson (1934); Moss (1952, 1953a, 1953b, 1955); Rowe (1972); and Strong and Leggat (1981). One of the most recent analyses of the vegetation of Alberta is by Strong and Leggat (1981). Twelve ecoregions were "recognized and delineated on the basis of recurring vegetation, soil, and moisture sequences" (1981:2). According to Strong and Leggat, Fort Dunvegan is located in the Dry Mixedwood subregion of the Boreal Mixedwood ecoregion. Although the terminology is slightly different, this delineation is similar to Rowe (1972), except that Strong and Leggat subdivided the region into Dry, Moist, and Wet Mixedwood. The finer division of this area is important, because the minor differences in vegetation and climate can be significant when attempting to determine the possibility of growing crops, the availability of certain types of vegetation, and even the distribution of certain animal species.

Alberta's Boreal region is "...characterized by a dominance of deciduous forest with secondary succession by spruces" (Strong and Leggat 1981:45). Covering almost 43% of the province, the Boreal Mixedwood ecoregion is broken into three subregions based on the amount of precipitation each region receives. The driest subregion includes the Peace River area. Aspen is the dominant deciduous species of this ecoregion and balsam poplar is a secondary species. Other species are mentioned below:

> The understory vegetation is varied although species such as reed grass, wild rye, pea vine, vetch, roses, dogwood, willows, and saskatoon are common components. Secondary plant succession is primarily by white spruce, although balsam fir occurs in old growth stands (Strong and Leggat 1981:28)

The designation of the Dry Mixedwood subregion is somewhat controversial, as some researchers consider this subregion to be part of the Aspen Parkland (Strong and Leggat 1981:29). However, Strong and Leggat state that the diversity in climate between the two regions is sufficient to support their division of the region into two separate ecoregions.

While it is important to determine the immediate environment of Fort Dunvegan, it is also necessary to identify the environments of adjacent areas to the Fort. Dunvegan was not totally isolated; rather, individuals responsible for the maintenance of provisions for the Fort's population often travelled great distances in their pursuit of large game. Natives bringing in provisions for trade may have travelled for several days or weeks from where they first obtained the animal. This may also be the situation for Native groups which hunted animals for their furs for trade at Dunvegan. Thus, consideration of the environments of the surrounding or adjacent regions to Fort Dunvegan is also necessary.

According to Strong and Leggat (1981), the general region can be divided into six ecoregions (Figure 2.2). Those ecoregions adjacent to Fort Dunvegan are the Boreal Foothills,the Aspen Parkland, and the Boreal Northlands. The ecoregions at a greater distance from the Fort are the Boreal Uplands, the Moist Boreal Mixedwood, and finally the Boreal Subarctic.

Summary

In summary, G. Dawson (1879) was the first to state that human agency has played a role in the development of the environment near Fort Dunvegan. The local Natives knew that the firing of an area had numerous benefits; among other things, it opened up areas by getting rid of dead wood and made the area attractive to wild game.

C. Dawson (1934) found that the prairie in the Peace River country was different from the prairies found to the south, and that circumstances were somewhat unique in this

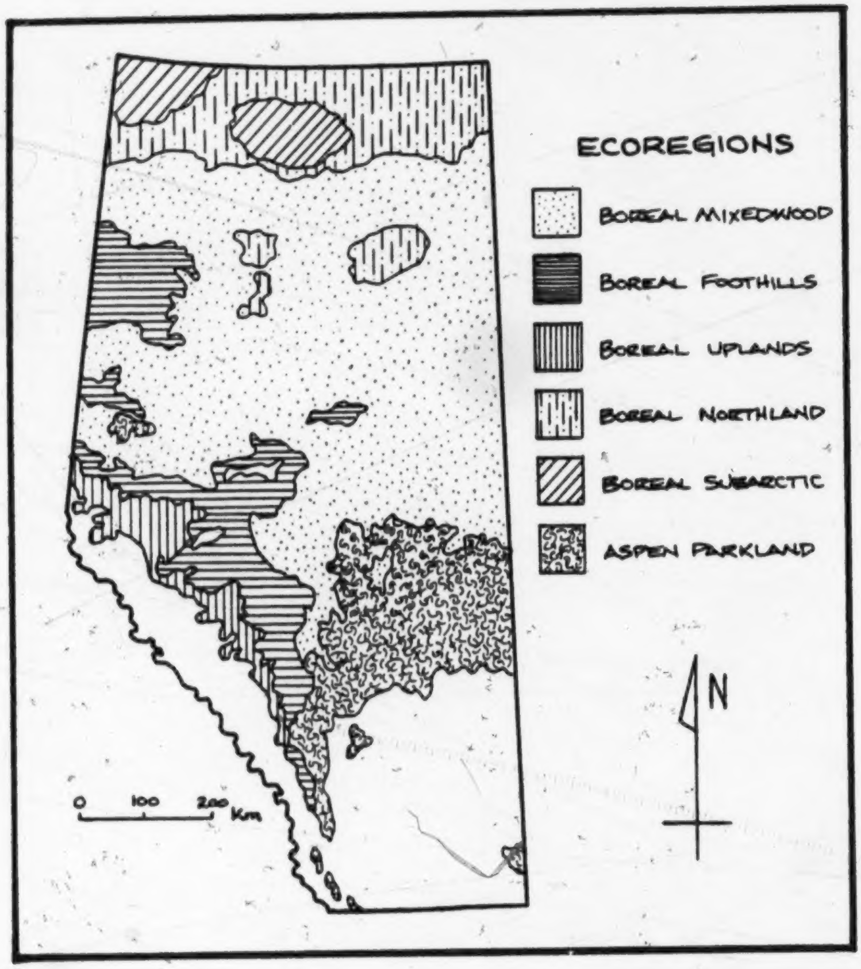

ECOREGIONS
BOREAL MIXEDWOOD
BOREAL FOOTHILLS
BOREAL UPLANDS
BOREAL NORTHLAND
BOREAL SUBARCTIC
ASPEN PARKLAND
0
100
200
Km
N

Figure 2.2. The six ecoregions in this text, modified from Strong and Leggat (1981).

area of the province. Moss (1952, 1953a, 1953b, 1955) regarded this region as being intriguing with regards to the occurrence of grasslands in a northern situation. He found that special circumstances prevented the whole region from changing from a grassland into a deciduous forest: the role of herbivores, the use of fires and the specific edaphic factors all combined to keep the region relatively free of encroaching shrubery and woody vegetation. The grassland that has developed is unique, as he found significant differences between the species of forbs in the Peace River grassland and those species in the prairies of southern Alberta.

Strong and Leggat refined Rowe's definition of the region as being Mixedwood Boreal forest. Fort Dunvegan is in the Dry Mixedwood subregion, which has features similar to Aspen Parkland. Specific environmental conditions differentiate it from Parkland regions.

Agricultural Potential

When George Dawson (1879) visited Fort Dunvegan in August of 1878, he found crops of wheat and barley growing. By the end of the month of August the wheat and barley had sufficiently ripened and were being harvested. A vegetable garden containing potatoes, cabbages, cauliflowers, beets, carrots, onions, lettuce, turnips, dwarf beans, cucumbers, and squashes was also noted by Dawson. The occurrence of the above crops and the numerous types of vegetables being grown successfully are remarkable in a location so much farther north than the richer agricultural areas in central and southern Alberta. As Dawson remarked: "It is the most important far-northern agricultural region in Canada, and a romantic interest pervades the history of its settlement" (1934:15).

C. Dawson stated that the extent of the land potentially available for agriculture "has no fixed boundaries" (1934:14) in the Peace River country (northwest Alberta and northeast British Columbia). Regarding the Boreal Mixedwood ecoregion, Strong and Leggat stated that "agriculture is common along the southern fringes of the Mixedwood boundary and in the Peace River Valley" (1981:29), and that the Dry Mixedwood subregion contains the majority of this agricultural land. It is therefore obvious that the agricultural potential of the area around Fort Dunvegan is quite high.

Several factors are necessary for the successful growth of cereal crops:

> The number of accumulated growing degree days, length of freeze free period, total May to September precipitation, and severity of moisture deficit are some of the more important climatic factors which promote or limit grain (wheat, oats, and barley) crop production. (Strong and Leggat 1981:40)

Although there are temperature deficiencies, some crops may be grown in the Boreal Mixedwood ecoregion. Strong and Leggat stated that alfalfa and other crops, which prefer cooler temperatures, may do well and that the Dry Mixedwood subregion appears "to be the most favourable area for grain production" (Strong and Leggat 1981:40). In comparison to the Aspen Parkland region, the lower crop yield in the Dry Mixedwood subregion is: "...probably due to lower temperatures, decreased solar radiation associated with latitude, frost damage, soils, and adverse climate at time of harvest" (Strong and Leggat 1981:29,30).

While climatic conditions and amount of solar radiation are important, rich soils are also necessary for a healthy growth of both cereals and vegetables. Moss (1952) stated that the development of agriculture in the region "relates closely to the parkland areas, with their native grassland and dark, rich soils..." (1952:99). The fertility of the terraces in the river valley were well known at an early time (Dawson 1934:18), and consequently it is not surprising that Dunvegan did so well. Indeed, the area today is being used for market gardens.

Conclusions

In conclusion, Fort Dunvegan was located in a unique environment where specific topographic and environmental conditions provided both the game and the development of agriculture to keep the Fort well provisioned and running for almost 100 years. It was situated in an area that had rich alluvial soils, and a summer climate suitable for garden and field crops. Other forts were not as successful in growing vegetable gardens or larger crops because their locations were in slightly different environments. Fort Dunvegan, on the other hand, became known for its prodigious gardens: "an extensive garden was cultivated at Dunvegan, and some of its produce went to less-favored posts such as Fort Vermilion and Fort Chipewyan, where crops could be grown with difficulty if at all" (Holmgren 1984:179). The area around Fort Dunvegan was diverse, with grasslands, marshes, wet meadows, and dense forests of both deciduous and coniferous trees. The game that could be found in these diverse environments only enhanced the wide range of animals needed for subsistence and for the fur trade itself. Those animals that could not be found close to the Fort could be obtained in enviroments at some distance away, and hence the diversity of animal resources was very high. This environment would have helped to influence the success of Fort Dunvegan, not only involving their subsistence strategies , but also involving the fur trade itself.

HISTORY OF FORT DUNVEGAN AND AREA

The Peace River Country is an extensive region of high quality agricultural land drained by the upper reaches of the Peace River in northwestern Alberta and northeastern British Columbia. It is relatively isolated from the more populated areas in central and southern Alberta by a "belt of rough, swampy country" that is approximately 200 miles (322 kilometers) wide (Dawson 1934:15). This isolation has resulted in the area being a "cultural island", and the history of its settlement has been romanticized:

> What is this far-famed Peace River Country? It is twenty-five thousand square miles of arable farm land. It is sixteen million acres of rolling plains, smiling fields and shining brooks ... It is a land of sunshine and clear blue skies ...This is the sunshine that greets a man in the morning and urges him to accomplishment. (MacGregor 1952:30)

The arrival of Euro-Canadians into this region occurred first along the banks of the Peace River itself, due to the ease of travel over the water as compared to the dense forests. The forests beyond the river were not explored to any great extent until after some settlement had already been established. Dawson stated that "the discovery of the Peace River area was incidental to the fur trade of the Canadian West" (1934:16). The North West Company was primarily responsible for the early exploration of the river (Wallace 1929:4). It was not until the early 1800s that the Hudson's Bay Company attempted to set up any forts along the Peace River. Wallace (1929) stated that the Peace River was first reached by the traders going down the Athabasca River: "It thus came about that the lower valley of Peace River was the first to be known" (Wallace 1929:19).

Fur trade operations in the Athabasca district were centered at Fort Chipewyan, established in 1789 by the North West Company, and located on the shores of Lake Athabasca. In 1792 the Company wished to expand their trade into the Peace River region, and built a fort located at the confluence of the Peace and Smoky Rivers, appropriately named Fort Fork (Pyszczyk 1983:6). Another fort, Rocky Mountain Fort, located much further upstream in what is now British Columbia, was constructed in 1794 (Williams 1978:28).

The first Euro-Canadian to see the site where Fort Dunvegan would later be built was Sir Alexander Mackenzie:

> Our first glimpse of the site of Fort Dunvegan is gained during Mackenzie's journey up Peace river in 1793, when on May 11th he met a chief of the Beaver Indians. But its first white visitor did not honour the site by landing. (Wallace 1929:73)

A quotation from Mackenzie's journal provides a picture of the situation that day:

> We now proceeded West-South-West, one mile and a quarter, where we found a chief of the Beaver Indians on an hunting party. I remained, however, in my canoe and though it was getting late, I did not choose to encamp with these people, lest the friends of my hunters might discourage them from proceeding on the voyage. (Mackenzie 1970:259)

The first mention of Fort Dunvegan is in a journal of Rocky Mountain Portage, in which an entry on December 20, 1805 reads: "Mr. Fraser left this, accompanied by M. McDougall to go down to Dunvegan as business required him there" (cited in Wallace 1929:71). Construction of Fort Dunvegan, located 57 miles (92 kilometers) above Fort Fork, began in the summer of 1805 (Plates 2.3-2.5). It was established by the North West Company (NWC), and was named "for the ancestral home of Clan McLeod on the Isle of Skye" (Holmgren 1984:175) by Archibald Norman McLeod, the Fort's first factor and founder. There were two reasons for its establishment. First, a post was needed as a base for exploration into New Caledonia because Fort Chipewyan was too far away for this purpose. Secondly, it "would also be convenient for trade with Indians of the immediate area" (Holmgren 1984:176).

At the time that Dunvegan was built, there were only four forts in operation on the Peace river: Fort McLeod, Rocky Mountain Portage, Fort Vermilion, and Fort Dunvegan (see Figure 2.3). Built in 1794, Rocky Mountain Fort was abandoned in 1805 and Rocky Mountain Portage was established at this time (Williams 1978:28). Fort Forks was also abandoned because of "the substitution of the new establishment at Dunvegan" (Wallace 1929:107). Substituted for the closure of Rocky Mountain Fort, Fort St. John (or Fort d'Epinette) was established in 1806. Williams has explained this as follows:

> The closure of Rocky Mountain Fort in 1805 meant that there was no fort between Dunvegan and the Portage and this left the Beaver without a place to trade within their own territories along the Peace. Fort d'Epinette ... was built to fill this gap. (Williams 1978:28)

In 1814, Rocky Mountain Portage was abandoned "in the hope of attracting the Indians to trade at Fort d'Epinette" (Williams 1978:28). This closure resulted in

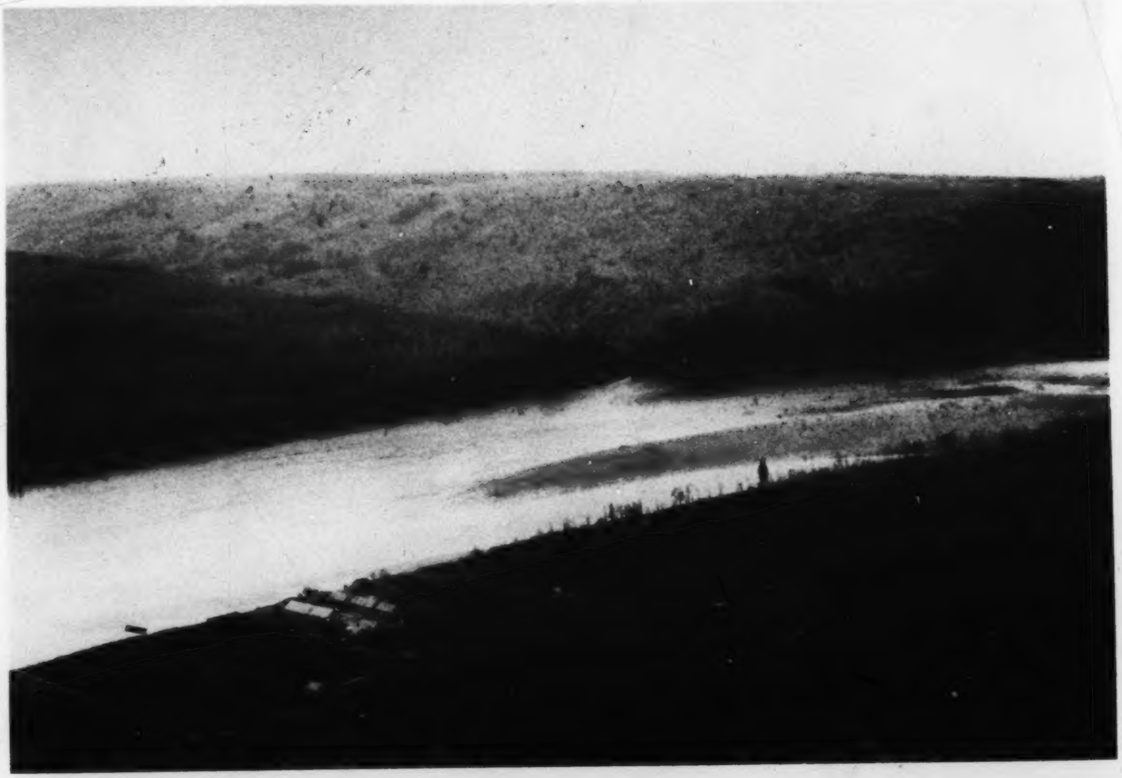


Plate 2.3 Fort Dunvegan in October 1872 (looking southwest).
Horetsky/National Archives of Canada/PA-9141

Plate 2.4 Fort Dunvegan in October 1872 (looking east).
Horetsky/National Archives of Canada/C-12230

Plate 2.5 Fort Dunvegan in August, 1879 (looking southeast).
National Archives of Canada/PA-51143

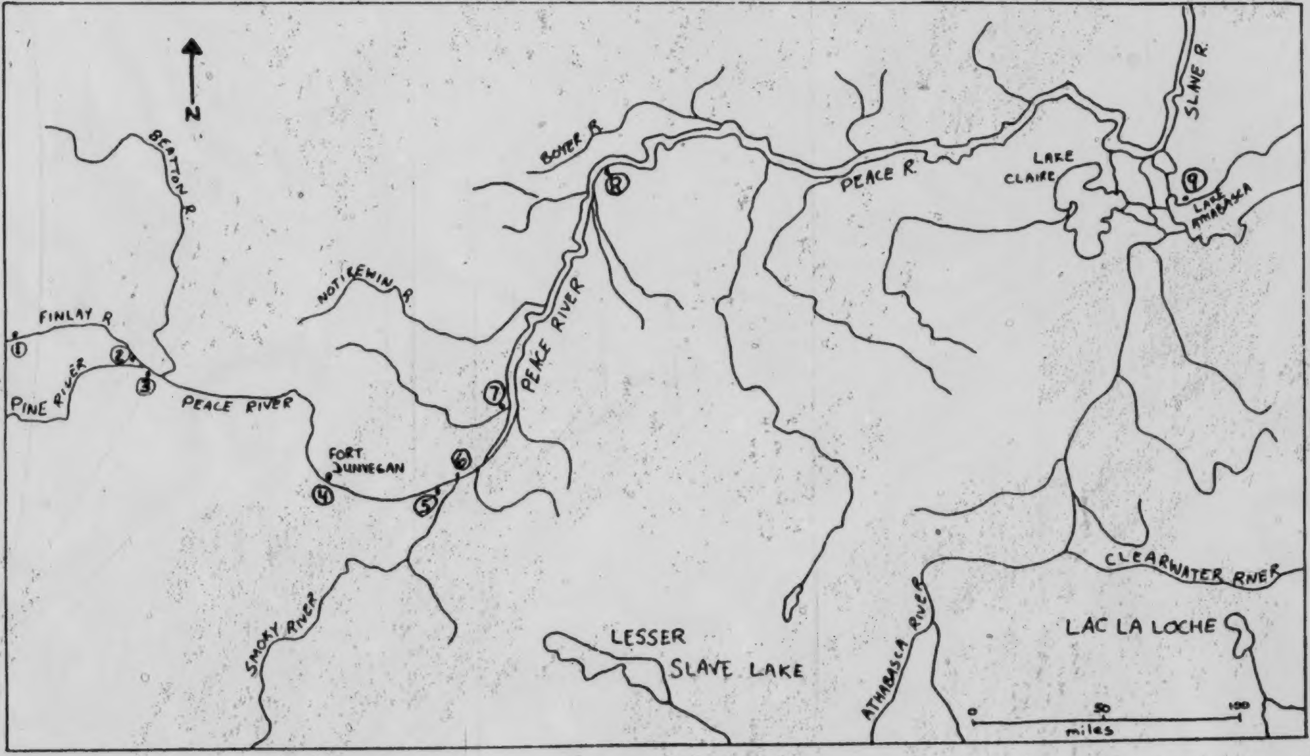

N
BEATTON R.
FINLAY R.
PINE RIVER
PEACE RIVER
FORT DUNVEGAN
NOTIKEWIN R.
BOYER R.
PEACE R.
LAKE CLAIRE
LAKE ATHABASCA
SLAVE R.
SMOKY RIVER
LESSER SLAVE LAKE
ATHABASCA RIVER
CLEARWATER RIVER
LAC LA LOCHE
0
50
100
miles

Figure 2.3. Location of historic forts along the Peace River.

(1). Rocky Mountain Portage
(2). Rocky Mountain Fort
(3). Fort d'Epinette
(4). Fort Dunvegan
(5). Fort Fork
(6). St. Mary's House
(7). Fort McLeod
(8). Fort Vermilion
(9). Fort Chipewyan

circumstances where the Sekani Indians had to travel through areas which were occupied by their enemies, the Beaver Indians. Neither group was pleased with this situation and numerous conflicts developed.

During the period of occupation by the NWC, the Hudson's Bay Company (HBC) decided to expand west into the Peace River region. After 1812 the HBC made attempts to enter and establish posts in this region, but the NWC strongly objected and made circumstances very difficult for the HBC. After two failed attempts, the Company finally was able to establish St. Mary's House in 1818 at the junction of the Smoky and Peace Rivers (Wallace 1929:106).

St. Mary's House continued in operation until 1821, when the union of the NWC and the HBC took place. It was abandoned when Fort Dunvegan became an HBC post. The area was rich with animals for trapping, and Dunvegan prospered. However, things did not run smoothly at other forts. Fort St. John began to develop problems in 1822. Williams has stated that: "...the pressure of supplying the New Caledonia brigade and continuing strife among the Indians were beginning to tell" (1978:30). In November of 1823, the man in charge of Fort St. John, Hughes, and five other men were murdered by a group of Beaver Indians. Many reasons are given for this tragedy, and the most popular comes from a Beaver legend which states that Hughes had: "...brought "bad medicine" against one of the young guides and when the boy died, the Indians killed in revenge" (Williams 1978:32, from Goddard 1916).

The HBC retaliated by closing Fort St. John, Rocky Mountain Portage, and Fort Dunvegan "...as a punitive measure in hopes that the resulting inconvenience to the Indians would induce them to apprehend the murders [*sic*]" (Holmgren 1984:177). Nevertheless, the murderers were never found. Fort Dunvegan remained closed until 1828; once it was re-opened the Natives eagerly traded once again with the Company.

Fort Dunvegan became a supply depot for goods headed for New Caledonia, especially for leather and pack cord which were unavailable in the latter region. "It was also the main gathering point for furs on the Upper Peace, and it remained so right to the end" (Holmgren 1984:183). Dunvegan was at a strategic location, and was important in the fur trade of the Peace River and beyond.

After moving the site of Dunvegan in 1878, it still remained in operation for another 40 years. The reason for the move is unknown, although Pyszczyk has suggested that: "...the buildings were probably in poor condition and it was easier to build new ones than to repair the old buildings" (Pyszczyk 1983:8). In 1886 Dunvegan lost its place as headquarters for the fur trade in the region, when Lesser Slave Lake became the headquarters (Holmgren 1984:182). The Fort Dunvegan HBC post was later closed in 1918.

NATIVE GROUPS OF THE REGION

Introduction

The Native populations in the area and their distribution were important because "Native people employed as hunters and fishermen provided vital support to the permanent trading facilities by harvesting the food resources of the bush" (Janes 1975:97). While many Natives in close proximity to the Fort would have had trade relations with it, there is evidence that many other groups also may have travelled great distances to trade furs at Dunvegan. This would be especially the case when other forts closed down (such as Fort St. John), or if certain forts did not have a trade item available which the Natives may have specifically desired and/or needed. The Beaver Indians are the closest Native group to where Fort Dunvegan was located. Groups adjacent to the Beaver included to the northwest the Sekani, to the northeast the Slavey and Chipewyans, to the east the Crees, and finally to the south the Sarcee. Iroquois, who were not part of the residential local

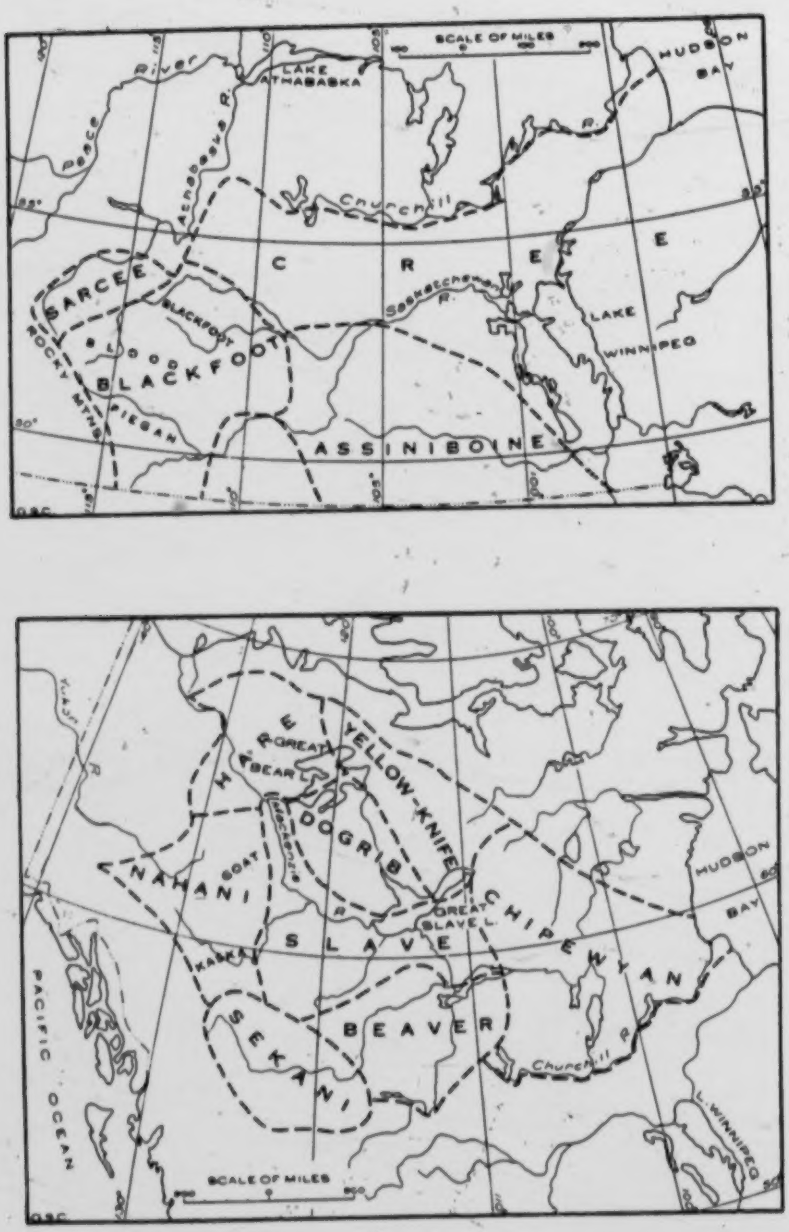

SCALE OF MILES
HUDSON BAY
LAKE ATHABASKA
Peace River
Athabaska R.
Churchill R.
C R E E
SARCEE
BLOOD
BLACKFOOT
Blackfoot
Saskatchewan R.
LAKE WINNIPEG
ROCKY MTNS
PIEGAN
ASSINIBOINE
G.S.C.
Yukon R.
HARE
GREAT BEAR L.
YELLOW-KNIFE
DOGRIB
Mackenzie R.
GOAT
NAHANI
GREAT SLAVE L.
CHIPEWYAN
HUDSON BAY
SLAVE
KASKA
SEKANI
BEAVER
Churchill R.
PACIFIC OCEAN
L. WINNIPEG
SCALE OF MILES
G.S.C.

Figure 2.4. Approximate locations of Native groups in the early 1700s. (modified from Jenness 1969:309,378)

population in pre-contact times, could be found dispersed throughout the region. They were present as a consequence of the fur trade. Figure 2.4 shows the general locations of all the previously mentioned groups.

The Beaver

The Beaver Indians, an Athapaskan-speaking group, occupied "...the region of the Peace River from the eastern base of the Rocky Mountains in British Columbia along the Peace River to the falls about forty miles below Vermilion" (Goddard 1916:208). According to Mackenzie (1970) the Beaver at one time lived in a much larger area, including: "...not only the entire basin of the Peace River below its junction with the Smoky, but the district around Lake Claire and the valley of the Athabasca river as far south as the Clearwater and Methy Portage" (Jenness 1963:382). However, the Beaver Indians were driven out of the Athabasca region by the more powerful Cree. This situation occurred because the Cree had firearms that they had obtained from forts in eastern Canada. When the Cree eventually made peace with the Beaver at Peace Point near Lake Claire, "[I]t was the spot where the Kristeneaux [Cree] and Beaver Indians settled their dispute; the real name of the river and point being that of the land which was the object of contention" (Mackenzie 1970:238). After peace was made with the Cree some of the eastern Beaver Indians adopted certain traits of the Cree, and traded along with them for a period of time at Fort Chipewyan (Jenness 1963:383). The Beaver Indians farther west, however, "...moved farther up the Peace river, displaced the Sekani from the mouth of the Smoky river to Rocky Mountain Canyon, and maintained their old customs for several decades" (Jenness 1963:383).

Goddard (1916) stated that at that time the Beaver Indians consisted of three separate groups: the locations of Fort St. John, of Dunvegan, and of Vermilion. Those Beaver at Fort St. John hunted: "...northward to the headwaters of the Liard river and camp as far down the Peace as the North Pine River ..." (Goddard 1916:208). The group at Dunvegan is now on a reserve 15 miles (24 kilometers) north of the river. A point of interest, in reference to the Beaver Indians, is that "[u]ntil a generation ago they used to live on both sides of the river under one chief and gathered on the flat by the river at Dunvegan for their semi-annual reunion" (Goddard 1916:208). Ridington (1981:359) also has stated that the Beaver lived on both sides of the river. The Beaver Indians at Dunvegan, like those at Fort St. John, had a specific territory to hunt in:

> They hunted northward to the headwaters of Hay River where they often met Beaver from Vermilion and Fort St. John, but not the Slavey of middle and lower Hay River. They also occupied considerable territory south of Peace River. They say there were no Indians living between themselves and the Fort St. John on North Pine River. (Goddard 1916:208)

They did not have direct contact with the Euro-Canadians until around 1786 (Goddard 1916:210).

The Sekani

The Sekani Indians, also known as Tsekanies, Sicany or Thikanies (among others), have similarities with the Beaver Indians. For example, their language "belongs to the Beaver-Sarcee-Sekani branch of Athapaskan" (Denniston 1981:433). They occupied regions to the west of the Beaver, including the areas around the Parsnip and Finlay rivers in British Columbia. To the south they "occupied the territory round the junction of the Fraser and Willow rivers" (Jenness 1963:378).

The Beaver and Cree were hostile to the Sekani. As a result of these hostilities, the "Sekani who in earlier times had wintered east of the mountains were forced to relinquish large portions of their former range and to remain year round in the mountains where resources were limited" (Denniston 1981:435). Forced to expand westward, they "occupied the country around Bear Lake and the northern end of Takla lake..." (Jenness 1963:378). The Sekani traded with numerous trading posts, including Fort St. John, Dunvegan, and Rocky Mountain Portage (Denniston 1981:439).

The Chipewyan

The Chipewyan Indians were located to the northeast of the Beaver Indians and lived in both the Boreal forest and the Barren Grounds to the north of it. The most important animal to them was the barren ground caribou and it played a role in almost every aspect of their culture. As Smith explains:

> The Chipewyan were marginal to the fur trade for, as Samuel Hearne (1958:135-136) pointed out, in their lands fur bearers were scarce and the Chipewyan required little in the way of trade goods, as the Caribou provided almost all their needs. (1981a:273)

Although this may be true, it appears that the lure of the fur trade was strong enough that some Chipewyans moved into the Boreal forest to become more active in the trade.

The Slave

The Slave, or Slavey Indians, occupied an area to the north of the Beaver. Their distribution included "...Athabasca lake, Slave rivers, and the western half of Great Slave lake " (Jenness 1963:389). After the invasion of the Cree, the Slavey were forced to retreat down the Mackenzie river to occupy the banks of that river to the west end of Great Slave lake. Asch (1981:338) also includes the Hay river area and the Liard river to the west.

They hunted moose and woodland caribou in the Boreal forest, but did not extend into the Barren Grounds.

The Cree (Plains and Woodland)

The Cree Indians expanded into the Peace River territory in the period from 1700 to 1780. Because they were the first to have firearms in the region, they were more powerful than the groups they encroached upon. The Cree expanded both to the north and to the west:

> ...so that by the middle of the eighteenth century they controlled northern Manitoba and Saskatchewan as far as Chruchill river, all northern Alberta, the valley of the Slave river, and the southeastern part of Great Slave lake. (Jenness 1963:284)

Riddington (1968) stated that while the Cree raided the Peace River area regularly, they "did not attempt permanent settlements" (1968:13). The fighting between the Beaver and the Cree must have been regular, because Mackenzie (1970:238) has on one of his maps the "Kristeneaux War Road". This road extends from the east end of Lesser Slave lake to a location near Fort Fork on the Peace River.

By about 1784 the Cree no longer engaged in expanding their territory, due to "the acquisition of firearms by surrounding tribes, and a terrible epidemic of smallpox that devastated them" (Jenness 1963:284).

As a result of being so extensive, the Cree can be broken into three smaller groups. The Plains' Cree, from the plains to the south, apparently spread periodically into northern Alberta, to the Peace River (Jenness 1963:317). The Woodland Cree are called the Western Woods Cree by Smith (1981b). They occupy the boreal forest of the "northern poritons of Ontario, Manitoba, Saskatchewan, and Alberta" (Smith 1981a:256). A further subdivision includes the Cree of Saskatchewan and Alberta named the Strongwoods Cree.

The Sarcee

The Sarcee Indians (Athapaskan-Speaking) are related to the Beaver Indians, and "the traditions of the two tribes assign them a common origin" (Jenness 1963:325). Goddard (1916) stated that: "It has been generally believed and sometimes stated that the Beaver and Sarsi separated only a short time ago" (1916:209). Jenness (1963) believed that the Sarcee's familiarity with hunting bison in the Peace river area led to a situation where they gradually moved south to hunt the bison in the plains. The Beaver Indians remained in the forest (Riddington 1968:13) and thus two separate groups were formed. Their territory included "the Peace to the Red Deer Rivers" (Jenness 1963:325).

The Iroquois

The final group to be considered is the Iroquois Indians. While they have their origins much farther to the east in Canada, they dispersed over the country and could be found in the Peace river region. Morice (1905:98) observed that the Iroquois followed the traders "generally as hired servants, but sometimes also as freemen, trappers, and hunters". Harmon (1957) stated:

> For several years past, Iroquois from Canada have been in the habit of coming into different parts of the North West Country, to hunt beaver, and c. [*sic*] The Natives of the country, consider them as intruders. As they are mere rovers, they do not feel the same interst as those who permanently reside here, in keeping stock of animals good... (Harmon 1957:193)

Consequently, while the Iroquois did not disturb the territorial boundaries of the various native groups because their numbers were so few and they were well dispersed, they were not welcome in the area. They may have traded with the various forts occasionally.

BOREAL FOREST ECONOMIC PATTERNS

The boreal forest economic patterns comprise only a portion of the full range of subsistence activities that would have been used during the occupation of Fort Dunvegan. The patterns would include how food was obtained, butchering techniques, trade networks, and diet, including game preferences. Those activities involved in the search for game, including the location of the hunt and the length of time involved, can also be included under economic patterns.

Numerous historic sources suggest that subsistence at frontier forts such as Fort Dunvegan was often precarious and that obtaining supplies for the occupants may have been a complex undertaking. For example, individuals at frontier forts had to subsist on 'country produce' because there was a company policy of self-sufficiency for the "reduction of incoming cargo and of transportation costs" (Innis 1956:301). Not only did local produce have to be grown, but the posts also had to obtain suitable amounts of animal food for necessary protein.

In order to determine the economic patterns, or hunting patterns, of the personnel of Fort Dunvegan, a discussion of the nature of the subarctic environment in which the Fort was situated in is necessary, along with a discussion of the resources available to the population living there. In the subarctic, the climatic differences between the seasons, particularly between summer and winter, can be quite significant (Strong and Leggat 1981). Short summers and long, cold winters characterize the region. "Of great significance to humans was the pronounced summer-winter cycle demarcated by spring break-up and autumn freeze-up" (Rogers and Smith 1981:130). This situation strongly affected the ability of humans to travel over the region because during these two periods travel and hence the search for food was highly restricted. Subsistence practices of the Natives and the EuroCanadians were thus affected.

A number of features need to be raised at this point concerning the nature of the subarctic environment. These features were chosen because they affect directly the availability of resources to human populations. One feature includes the local animal populations who have developed a number of coping mechanisms to survive in this environment. For example, for the winter months many bird species migrate to warmer regions to the south and many mammals hibernate. Therefore certain species may be available only during specific times of the year.

Another particularly important feature of the subarctic is the presence of animal cycles. Certain northern wildlife populations experience fluctuations in their numbers (of scarcity and abundance) over a period of time, which Keith (1963) has termed the 'ten-year cycle'. He has stated that there are two types of fluctuations: the first is a three to four year fluctuation which involves lemmings, mice and other small rodents associated with the arctic and alpine tundra. The other fluctuation is associated with the boreal forest, and is a nine to ten year cycle involving snowshoe hares, muskrats, and grouse, among other species. As early as 1775 there are written accounts in historic Hudson Bay journals of periods of extreme scarcity of grouse and some furbearers, as recorded in journals at Cumberland House (cited in Keith 1963:5).

The following species can exhibit cycles, which may or may not be regular. They can also have variations in numbers both locally and regionally; an unpredictable population drop may occur in one area but not in another.

- ruffed grouse: a 7 - 10 year cycle
- prairie , spruce and blue grouse, ptarmigan and Hungarian partridges: there is limited information, but they appear to be cyclic
- snowshoe hare: 7 - 12 year cycle
- muskrat: irregular 8 - 10 year cycle
- lynx: 9 - 10 year cycle
- mink and fisher: 8 - 10 year cycle
- colored fox: 8 - 10 year cycle

Waisberg (1975) has stated that population fluctuations also exist for fish and larger game including beaver, wapiti, deer and moose. This information is contentious, however, because available ecological data are not as extensive for large mammals as they are for smaller mammals. Cycles for large game are quite different because they are much longer than the usual ten-year cycles. For example, it has been proposed that moose and caribou may have cycles of somewhere between 35 to 70 years (Waisberg 1975:175), but the cycles appear to be random rather than periodic.

The interdependence of several mammals such as the lynx, fox, coyote, fisher and marten on the hare for subsistence can have significant repercussions. When a hare population drops, there may be examples of starvation of these other mammals (Waisberg 1975:173). The predator-prey relationship has been disturbed, and the predator population can exhibit a low for one to two years after a prey population drop. Moreover, the predators can make extensive movements at this time in search of alternative food.

An interesting point concerning the hare is its habitat usage. It appears that during population peaks hare may be found in both marginal and favourable habitat areas, but only in favourable habitats during a low (Keith 1963:88,89). As favourable areas become too populated during a population high, the hare may disperse over the landscape to less favourable areas in search of food. Keith (1963) stated that "it has been periodically observed that rabbits may 'mass move' from one area to another" which is attributed to population pressure and food shortages. One final note is that "it is believed that hares and grouse are much tamer when abundant, attributed to the 'relatively secure, easy and non-hazardous' life in dense populations" (Keith 1963:96).

The above information regarding animal population cycles in the boreal forest is meaningful, as these cycles will affect human subsistence and adaptation patterns. For example, when hare populations begin their decline, it is most often in late winter or early spring (Keith 1963). This is one of the most difficult periods of time for human populations to find food, and if a 'crash' in hare populations occurs there is one less reliable source of food to pursue. Thus during a population decline of hares, human groups can be put under considerably more stress and they must turn to other animal species for food.

The situation can be quite different during a hare population peak. Hare may be found almost everywhere, and not just in their prime habitats. The local human population will be aware of this, and they will react accordingly by setting snares and hunting for them in more areas. In addition, the people may not have to travel as far to obtain them, which is a great advantage. Honigmann (1948:156) has stated that there "is no question but that in years when he is abundant the rabbit provides an important source of winter food". The fact that hare appear to be more tame during a population peak is an additional advantage, because they will be easier to kill. Therefore, overall a hare population peak is beneficial to the human populations because it means a reliable and abundant source of food for a period of time. Speaking of the Beaver Indians, Goddard (1916:214) has stated that "one of the important food supplies is the large hare, or rabbit, as it is commonly called...when rabbits are plentiful food of some sort may be had by everyone". Unfortunately, a population drop will occur eventually and it can cause hardships for human populations. Indeed, the presence of animal cycles of quite a number of species inhabiting the boreal forest is important when considering the subsistence patterns of a human population living in this region. The populations of many small and medium mammals, and some birds, can be quite variable and not always predictable. Native populations in this area were aware of this variability, and they adapted to these situations. For instance, if there was a particular population low in one species, such as the hare, the people turned to other species as a major food source, hence changing their hunting patterns. However, it seems that their subsistence was often precarious because of these situations, and that they had to make a number of adaptations to deal with it. Obviously one adaptation was their flexibility with reference to deciding which species to emphasize in their diet at a certain time, and also that they had to be able to change as the forest and its animal inhabitants changed.

One final phenomenon which is important to human populations living in the boreal forest is the overall ecology of the forest itself. "The life cycle of the forest affected its faunal composition and carrying capacity" (Rogers and Smith 1981:130). The role of forest fires and succession of the forest are inter-related. Forest fires, common in the area, retard both the age and biomass growth of the forest by destroying climax forests and initiating new young growth. The fires destroy the food supply for many species. Certain animal species are associated with certain successional stages of the forest, and if a forest fire occurs, these species will leave the area and new ones will migrate in as new growth begins. As a result there will be a movement of animal populations, and accordingly movements or adjustments by human populations may take place due to the changes in species availability and abundance. Mobility by human populations is therefore also necessary and advantageous because of these conditions. As Waisberg (1975:174) has stated, "a considerable amount of instability must be added to the anthropological conception of northern ecosystems".

Discussion

Based on the above information there are two points which need to be emphasized. The first point is the amount of knowledge that hunters needed to exist and successfully hunt game in the subarctic environment. The second point is how Natives dealt effectively with the negative aspects of the environment in terms of their adaptations.

Nelson (1973:183,184) has discussed in some detail the knowledge required for "successful exploitation of the subarctic forest" by Native Indians. He stated that the key is to have an intimate knowledge of the landscape. For example, "Kutchin travelers must know the location of many trails, and of portages between lakes or across river bends. They should also know every hill, ravine, creek, or meadow - in short, every detail of the local landscape" (Nelson 1973:183). Animals and plants are associated with certain habitats and microhabitats. Knowledge of the local geography would lead to the knowledge of where to find certain game. In addition, travel to and from specific locations is greatly facilitated by the knowledge of the fastest and/or easiest route. "The longer a man travels in a particular region, the more adept he becomes at using the best routes and avoiding unnecessary expenditure of time and effort" (Nelson 1973:184).

Nelson emphasized the fact that it can take an individual many years to become thoroughly familiar with a particular area. Using the Alaskan Kutchin as an example, he found that no individual had a complete knowledge of "the entire area exploited by the aggregate village population" (1973:184). Rather, each individual would concentrate or specialize in one particular area, which in this case is where his trapline was located. It is this area that the hunter/trapper became most closely familiar with, including all the trails in the area, the waterbodies, the portages, and the various microhabitats.

The other point which should be emphasized is the way that the people have adapted to difficult conditions, in that they are flexible and able to change along with the variable circumstances and resources of the subarctic environment. For example, with reference to social organization, kinship systems were fluid allowing for a variety of potential relationships, which could provide a "base [for] temporary, seasonal, or permanent alliances and for cooperative association, mutual assistance, and hospitality" (Rogers and Smith 1981:144). The more kin ties there were, the more likelihood that people could go for help when it was most needed. Janes stated that the Athapaskans in the Mackenzie Valley coped with the "precarious food supply through a system of flexible, egalitarian social groups, characterized by a high degree of mobility" (Janes 1975:83).

The above two points are important. Intimate knowledge of the local geography was essential to be able to find the game, as was knowledge concerning the habits and habitats of each species within that area. The high variability and unpredicatability of the environment and its game was a negative factor. However, subarctic Indians adapted to it by allowing flexibility regarding most aspects of their lives. Specifically, they were mobile, moving when conditions dictated, and they were flexible in terms of their social organization. If Natives had not been able to adapt in the above fashion it would have been next to impossible to exist successfully in the subarctic environment. A question must then be raised: how did the EuroCanadian, unfamiliar with the local environment and living in a permanent settlement such as a fur trade post, exist under these circumstances? Indeed, Janes (1975) raised this point after he stated that the Athapaskan culture was characterized by a pattern of mobility and fluidity. He asked: "how is it that Fort Alexander and other trading establishments, all permanent establishments, were able to remain operative even during their sometimes brief occupations?" (1975:83). Fort Dunvegan, occupied for well over 75 years, was able to exist under these circumstances. This is highly unusual when one considers the fact that many forts were operable for only a few years and then had to be closed. The following is a discussion of this situation.

The fur trade post

The fur trade post is an example of a permanent settlement situated in an environment with variable resources. The subarctic environment was best exploited by utilizing a traditional logistically organized mobile strategy (Binford 1982), whereby semi-permanent home-camps could be moved from time to time as the resources in the location were exhausted. This mobility was not possible for a permanent settlement such as a fur trade fort, and thus the fort's inhabitants must have made certain adaptations to deal with this potentially contradictory situation. For example, as resources became exhausted in the local area around the fort, the inhabitants may have compensated by extending their foraging range. This may have been difficult in the first few years of a fort's operation, however, because many of the EuroCanadian fort employees were foreigners who were not familiar with the local environment. As emphasized previously, knowledge of the local environment was an essential feature of local adaptations. Another way that the inhabitants may have adapted to their situation was to plan ahead and situate their fort in a highly favourable microenvironment which would support a stable residence over a period of time. Janes (1975) has termed this adaptation the "EuroCanadian adaptive process":

> Adaptation in this particular context may be loosely defined as the various policies, patterns, and adjustments undertaken by the NorthWest, XY and Hudson's Bay Company traders in an effort to cope successfully with the

> Subarctic environment, the requirements of daily existence, and the demands of the fur trade. (Janes 1975:72)

In reading historic journals, particularly those from Fort Dunvegan, it became apparent that fur trade posts remained viable through the employment of local Native hunters. This solved the problem for the situation where EuroCanadians were not familiar with their local environment. It was thus cost-efficient to employ Native hunters to provide provisions for the fort's occupants, because the fur traders could then concentrate on other activities concerning the functioning of the fort, particularly with its role as a business. The Dunvegan journals indicated that some residents of the Fort did do some hunting, but if they failed in their hunts they were able to depend on the Natives to bring in food. Just how dependent the Fort's occupants were on the Natives for subsistence is not clear, however. For example, we do not know whether the Natives were just a backup in case the residents were not able to procure animals, or if they provided the majority of the food eaten at the Fort. These and other questions will be addressed later in this thesis. What is important here is the fact that the forts were able to adapt to the conditions of the environment and its variability in animal populations by employing Natives who were already well adapted to the area. As Janes observed, "...the limiting factors imposed by the ecology were sufficiently overcome through assiduous planning and the deployment of the Native[s]..." (Janes 1975:86).

ECONOMIC ZONATION AND FORAGING STRATEGIES

The foraging strategy of a group of people can influence overall subsistence patterns and strategies. Binford (1983c) has developed a 'strategic foraging strategy' theory based on the Nunamiut Eskimos, in which the strategy entailed the establishment of a system of economic zonation for hunter-gatherers. This system was applied to the particular situation at Fort Dunvegan, in order to determine more clearly the subsistence strategies and practices that would have taken place. The one point that is particularly important , and which will be discussed in more detail, is the concept of a fur trade post as a 'hub' of activities taking place within a region.

Binford was interested in site patterning, as he stated in the following: "the accuracy with which we are able to give meaning to the record is dependent upon our understanding of the processes which operated in the past to bring into being the observed patterning" (Binford 1983c:358). This interest in site patterning led him to discuss economic zonation, whereby he conceived of sites as having zones of specific activities, and tactical mobility, which he described as the "accommodation of a system to its broader environmental geography" (1983c:358). He attempted to demonstrate that the interaction between economic zonation and tactical mobility can have significant consequences for site patterning. He developed a model of economic zonation for sites and their associated camp range or territory. This is pertinent to Fort Dunvegan because it was a permanent location with an associated range of hunting, trapping and other activites. Binford's model of economic zonation can be used to elucidate more clearly the subsistence patterns of Fort Dunvegan.

The core unit in this zonation is the residential camp. Immediately surrounding the camp is the "play radius" for children or the "campground" for visitors. This zone is "generally quickly overexploited and therefore may provide very little in the ways of food except, of course, in the event there is a highly aggregated, renewable resource near the site" (Binford 1983c:359). Beyond the "play radius" zone there is the "foraging radius", which is the area "...searched and exploited by work parties who leave the camp to exploit the environment and return home in a single day" (Binford 1983c:359).

Beyond the foraging radius is the zone which is utilized by "task groups" who are away from the residential camp for longer than one night before returning. These forays into the logistical zone can have significant archaeological consequences, as Binford has stated that:

> ...maintenance accommodations including food, shelter, etc., must be provided for the work party while it is away from the residential location. Thus, the remains from exploitation and processing for transport, from consumption, and of creature comfort accommodations of the task group all contribute to the materials remaining at logistical camps.(1983c:359)

The "extended range" is beyond the logistical zone is an area which may not be exploited at all times but will be familiar to the people in terms of keeping "informed with respect to resource distributions and changes in production" (1983c:359).

One particularly important point which Binford discussed is the difference between conceptualizing the zones as (1) concentric circles around a central locus, or as (2) a residential camp "at the hub of a foraging and a logistical radius" (Binford 1983c:360). He felt that the latter was more realistic because the area is not just conditioned in scale by transport and labour costs at different distances from the base camp (which is the only factor taken into account for the concept of concentric circles). The 'hub' theory is also conditioned by "the need for information regarding a much broader area, ...critical for making decisions regarding future moves" (Binford 1983c:360).

Referring to mobility patterning, Binford described three patterns of movement applicable either to what he termed 'foragers' or 'logistically organized' groups. Mobility, he felt, is " the way in which the ... economic zones around a residential camp are differentially adjusted relative to the concrete distribution of resources in the habitat" (1982:360). The three patterns of movement (or mobility) are as follows: (1) the half-radius continuous pattern, (2) the complete radius leapfrog pattern, and (3) the point-to-point pattern.

The half-radius continuous pattern, and the complete radius leapfrog pattern are both characteristic of highly mobile hunter-gatherers. The latter is seen in high-biomass environments. Point-to-point mobility is more commonly seen in lower-biomass settings where "a residence is moved from one relatively rare location providing access to food, water, and fuel to another such location within the region" (1983c:361). Binford noted that the Nunamiut, who are characteristic of this pattern, move camps to places that have been specifically chosen for such rich locations. This indicates forethought, in that the people were not randomly wandering but purposefully moving to specific areas. Therefore it indicates a logistically-organized group.

The difference between foragers and logistically organized groups can be significant. Binford stated that:

> Residential placement in logistical systems is a compromise strategy relative to already known resource distributions, while forager strategies emphasize tactics aimed at learning about the distribution of resources in a region. Foragers employ coverage tactics, while collector site patterning derives from positioning tactics relative to a prior knowledge of resource distributions. (Binford 1983c:361)

It is essential to understand this difference, which Binford has further discussed in other publications (e.g., Binford 1983d) , particularly when attempting to characterize a specific group of people with reference to mobility patterns.

Binford shifted his emphasis from understanding mobility and land-use in a living system to the perspective of an archaeological site (1983c:362). The point which he attempted to make is that mobility can affect land-use zonation. That is, as a group of people move over the landscape, each new camp will produce a new hub with its associated foraging and logistical zones. The problem is that what may have been a logistical zone in the past may now be a foraging zone. Certain types of sites are associated with these zones, and specific sites may be used for different activites depending on the location of the hub or residential camp. Therefore, what once was a lookout in the logistical zone may now be used as a kill-site within the foraging zone. These patterns of land-use and mobility may have significant archaelogical consequences.

> From an archaeological perspective we would expect *special use areas* in the play radius, primarily *locations* within the foraging radius, and in the zone of the logistical radius, *field camps*, *stations*, and *caches* may in fact be the dominant types of sites generated. (Binford 1983c:363; emphasis in original)

On the basis of the types of sites stated above, it is clear that specific types of sites yield specific artifact and faunal assemblages, among other things (i.e., types of land-use, shelters, etc.). If the site is buried each time it is utilized (through natural depositional processes), then it may be possible for the archaeologist to determine site function. However, should these depositional episodes between subsequent occupations not occur, then the result could be a palimpsest assemblage (Binford 1983c:367); that is, the artifacts could represent one or more occupations representing several different types of site-use and activities. By not being aware that the assemblage and site could possibly represent several discrete occupations (representing site types of foraging and/or logistical zones), then serious misinterpretations can and will be made by the archaeologist.

SUMMARY

Subsistence practices of the fur trade may be determined by a number of factors. These factors can include the local natural environment, which influences what animal species will be present, and the distribution of Native groups in the region.

Fort Dunvegan was located in the Peace River valley, in the Boreal Mixedwood region of Alberta. It was situated on a rich alluvial flat, which allowed for the successful growth of vegetable and cereal crops. In addition, because it was in a valley, it was more protected from the extremes of weather experienced at the prairie level.

Previous research concerning the physical environment of the Peace River region has indicated that there is a wide diversity of environments in the vicinity of Fort Dunvegan. These include grasslands (possibly maintained and modified by humans), and some marshes or wet meadows within a parkland-type vegetation. One of the more recent analyses (Strong and Leggat 1981) states that the region is a Boreal Mixedwood ecoregion as opposed to a Parkland ecoregion; this is due primarily to climatic differences. The region is accordingly diverse, and many animal, bird and fish species could be found in the area because it provided a number of different habitats for the species. This situation is quite different from the southern posts located in the Plains region, because the prairie provided a smaller number of habitats and in general a smaller diversity of species was pursued.

A number of other ecoregions could also be found in the region of northern Alberta. They were briefly described above, because the identification of what other ecoregions and animal habitats that were available for the population at Dunvegan is useful. For example, if certain species were not available locally, then the Fort's residents may have travelled to these other ecoregions, or they may have relied on incoming trade from these regions.

The local Native group, the Beaver Indians, traded at Fort Dunvegan. They were also hired as hunters for the Fort, and would have utilized the numerous other ecoregions besides the closest ecoregion. Also, there were a number of other Native groups to the north, west and east of the Fort. These groups may have periodically traded with the Fort, and would have expanded the resource base of Dunvegan.

Finally, the agricultural potential of Fort Dunvegan was unique because it had rich soils and a suitable climate for agriculture. Other forts in the region had small gardens, but it appears that Dunvegan had one of the larger gardens due to its suitable location. This was beneficial to the functioning of the Fort, because during times when animals could not be found for subsistence, the Fort could rely on its gardens (or vice-versa). They were complementary resources for an essentially non-mobile population. The Fort probably relied on a wide variety of animals for subsistence, due to its varied habitats both near and far. Native Indians, Beaver or otherwise, could bring in food from greater distances which alleviated the pressure on local animal populations. For a variable diet and especially for a back-up in times of stress, the Fort could rely on its gardens for food, particularly vegetables. This last feature may not have been feasible at other northern forts. In short, it is not surprising that Dunvegan was able to maintain itself in one location for nearly one hundred years.

CHAPTER THREE

HISTORICAL DOCUMENTATION OF PAST SUBSISTENCE ACTIVITIES AT FORT DUNVEGAN

INTRODUCTION

As stated in Chapter Two, Fort Dunvegan was occupied for well over 75 years by personnel of the North West Company and the Hudson's Bay Company. The occupation of this Fort is well documented in numerous historic journals and account books kept by the Factor of the Fort (see Table 3.1). There were a number of Factors who were in charge of Dunvegan over time, and as such the information and style of writing was quite variable. However, in general, the data contained in these journals are rich with information concerning subsistence activities and diet, though problematic to deal with at times.

A number of hypotheses can be constructed on the basis of the historic documents, and these can be tested against archaeological data obtained through excavations at Fort Dunvegan. While numerous hypotheses are possible, the aim of this chapter is to discuss three main ones that were developed from reading the journals. In addition to this discussion, the results of the application of Binford's economic zonation and foraging strategies theory to Dunvegan's historic data will be presented. It will cover the foraging strategies developed by Native peoples, and it will be applied to the subsistence strategies at Fort Dunvegan. It is hoped that from this information, significant data pertaining to cultural formation processes with reference to subsistence practices can be established. As Pyszczyk has stated: "To what extent do various factors serve to complicate the record

TABLE 3.1: Factors of Fort Dunvegan and The Available Historic Journals

Journals	Company Trader/Factor
1806	A.R. McLeod (N.W. Co.)
1807-08	A.R. McLeod (N.W. Co.)
1822-23	unknown
1824-25	Hugh Faries
1825-28 (Fort Closed)	---
1828-1830	Colin Campbell
1834-35	Colin Campbell
1835-36	Colin Campbell
1836-37	Colin Campbell
1837-38	A.R. McLeod
1838-39	Colin Campbell
1839	Colin Campbell
1839-40	Colin Campbell
1841-42	Francis Butcher
1842-43	Francis Butcher
1843-44	Francis Butcher
1844-45	Francis Butcher
1847-49	Francis Butcher
1853-55	Henry Maxwell
1866	James V. Dunlop, Clerk
1874	Donald Ross

of animal utilization?...there may exist significant discrepancies between the historically known subsistence pattern, and the recovered faunal data"(1978:35).

HYPOTHESES

A brief word of explanation is necessary to clarify the following hypotheses. As stated previously, the analysis of the Fort's journals was aimed specifically at subsistence practices, particularly animal food procurement by the Fort's population. In a discussion of food procurement at Fort Alexander, Janes (1975:83,84) found that a large percentage of a fort's diet was supported and supplied by locally-hired Native Indians, called 'Hunters'.

> Native peoples were employed as both hunters and fishermen to gather food for the forts, in addition to the hunting activities of the post's residents. The importance of these fort hunters cannot be overemphasized ... (Janes 1975:83)

Furthermore, Natives conducting business with a fort were encouraged to bring in food to trade as well as their furs. During the analysis of the Fort Dunvegan journals, it became clear that this secondary source of food, which was brought to the Fort by the fur traders, was significant. The trade of food with the Hunters was on a contractual basis; on the other hand, trade with the Natives was coincidental because the trade of food was random and could not be relied upon at all times. Hence there were two distinct types of trade that were identified as taking place at Fort Dunvegan, and they will be explained in more detail later in this study.

Specific behaviours involving past subsistence patterns (cultural formation processes) will be elucidated from the analysis of the hypotheses. It will be possible to discuss what past behaviours have taken place at Dunvegan, and how they have influenced the formation of the zooarchaeological assemblage. It will then be possible to investigate the processes lying behind the observed continuities and discontinuities which may exist between the archaeological assemblage and the data from historic documentation on the same site.

The hypotheses are as follows:

Hypothesis One:

> 'Contract' and 'Coincidental' food trade by Natives was a significant portion of Fort Dunvegan's subsistence, and these two types of trade can be identified in the zooarchaeological record.

Contract Trade and Coincidental trade (to be discussed in more detail later) are two separate types of trading of food between Natives and the Fort personnel (the trade of furs will not be considered in this analysis). Different bone elements will be recovered archaeologically depending on the type of trade and the different cuts of meat associated with them. Hence what was deposited as refuse depended on the nature of the trade itself.

Hypothesis Two:

> A high percentage of food brought to the Fort was in a boneless form (i.e., dried meat), and therefore would not be reflected in the archaeological record.

This hypothesis essentially involves the percentage and/or amounts of animal food which may leave no archaeological correlates versus those which do. Information for this hypothesis can be obtained from the Fort's account books.

Hypothesis Three:

> The type and numbers of animals consumed by members of Fort Dunvegan can be ascertained from historic journals, and the documented boned meat will be accurately reflected in the faunal record.

Not all food coming into the Fort was in a preserved form. That food which was fresh will be analysed under this hypothesis. The variety of species of mammals, birds and fish, and the frequency of each species can be discussed and outlined. This information can then be compared to ranking lists of species established from the archaeological faunal assemblage.

THE USE OF HISTORIC DOCUMENTS

The use of historic documents can be varied: first, they can supplement archaeological data; secondly, they can be used alongside archaeological data, which then provide two different viewpoints; and finally and most importantly, historic documents can provide the base for hypotheses to test using archaeological data. Historic documents can be invaluable, yet it must be stressed that they are fallible because they can be inaccurate and/or biased.

Stanley South, for example, has stated that the use of historic documents "...does not result in a different kind of archaeology merely because a wider data base is available" (South 1977:b). He felt that it was circular reasoning if one only used archaeological data to supplement written records (South 1977a:23). Likewise, one could also state that it is circular reasoning if one uses historic documents to simply supplement the missing pieces of archaeological data. This occurs because the addition of new information is essentially in a closed system. That is, the contribution from historic documents is used to augment the missing data, rather than to generate propositions and theories which can then be *tested* using the archaeological data. "The excavation of fur trade forts may furnish a base against which we can examine the validity of ethnographic analogy and can be the testing ground for archaeological methodologies and interpretive techniques"(Williams 1978:1).

Deagan (1988:10) has stated that middle-range theory can be developed in historic archaeology, by linking observations from the historic documents to those observations from the archaeological record. Cleland has similarly noted that "...historic archaeology, unlike prehistoric archaeology, has the potential to provide independent tests of propositions using two distinct and fairly reliable data sets, that is written/oral as well as archaeological data"(Cleland 1988:15).

Reitz and Scarry (1985) studied historic subsistence patterns using a site from Spanish Florida dated to the sixteenth century. They had both historical records and archaeological data available, and felt that this information provided "...two perspectives on the subsistence system of sixteenth-century Florida" (Reitz and Scarry 1985:92). By combining the two sources of data, they were able to discern a pattern of subsistence by the colonists.

A considerable number of written documentary sources served as the data for this chapter. The nature of this information, particularly its validity and reliability, therefore needed to be questioned. Hickerson (1970), in a classic study of various aspects of the Chippewa culture, presented three research problems and attempted to solve them by applying ethnohistoric methods. Using and interpreting primary documents, he succeeded in illustrating the advantages of utilizing documents to supplement other methods of research.

Janes (1975), in discussing the integrity of written sources for his analysis of the Athapaskans, found a useful method that is normally utilized by historians and is called 'diplomatic' (from Dymond [1974]). Referring to all classes of records, Dymond (1974:60) stated that the 'diplomatic' method is "no more than a logical enquiry into their internal and external consistency".

> There are two main ways in which a document can be assessed. First, it should be consistent within itself. ... Secondly a document should be consistent with available external evidence. (Dymond 1974:60)

The origin of the document must be determined along with the writer's involvement with the subject including "his or her position relative to the events described" (Dymond 1974:62). In the case of the documents from Fort Dunvegan, the historic journals are dated, original and primary documents from the time period involved. Most documents and archival material are stored at the Hudson's Bay Archives located in Winnipeg, Manitoba, while others are located at the Provincial Museum and Archives of Alberta (PMAA) in Edmonton. As such, these documents are reliable with reference to their source and dates. However, there are still questions concerning the observations of any particular writer.

In analyzing fur-trade documents, Black-Rogers (1986) discussed the fact that the record-keeper is viewing Natives from a culturally biased perspective. The trader's journals reflect "...the aims and the particular cultural perspectives of the elite minortiy of the period, the literate English or French speakers" (Black-Rogers 1986:375, note #1).

Unfortunately she also found that the journals may represent a selective view of events in a "business-biased record", leading to a "...lopsided idea about the trader's Indian customers if they rely solely on that man of business for their knowledge" (Black-Rogers 1986:354). Other aspects of Native life are often omitted, and it is frequently these aspects which are of most interest to anthropologists and archaeologists alike. This was also found to be the case in studying sixteenth-century documents concerning early colonists in Florida, in that the records often did not provide the "details that anthropologists seek" (Reitz and Scarry 1985:2).

In addition, contradictions involving what was said by the author and the purposeful misrepresentation of information can both be found in historic documents (Reitz and Scarry 1985:2). "Much of what occurs in old journals or letters should be scrutinized. It was tempting for a writer to represent himself as very zealous against his employers' rivals, and to tone down, or colour up, events" (Wallace 1929:94). While this may be the case, some misrepresentation of information can be avoided in this study because the emphasis here is on subsistence practices, and not the fur trade itself.

Knowing the above information, it is still possible to obtain valuable insights concerning the activities and patterns of life at Fort Dunvegan, particularly subsistence patterns. Dymond (1974) made a good point in stating:

> It is not enough to divide the documents into genuine or false, or writers into trustworthy and untrustworthy, nor should one rely on a document just because, for example, it has more details than others, or is written more forcefully. These approaches, all initially useful, soon become too superficial because the average document consists of many individual statements, each of which may be true, untrue, partly true, ambiguous, inaccurate and so on. (Dymond 1974:63)

In summary, it is evident that the documents utilized for this study are original and dated records and hence can be confidently used to study the subsistence history of Fort Dunvegan. Also, even though these documents are potentially biased, a great deal of information can still be obtained, particularly concerning subsistence activities.

The Fort Dunvegan Journals

Table 3.2 lists the journals from Fort Dunvegan that still exist, as well as the account books and the Recapitulation of Furs for the Spring Outfits. All documents were analysed for their completeness and for the determination of which authors could provide superior data concerning subsistence.

A number of problems occurred during the analysis of the journals. One of the primary difficulties was the variability of information provided by the various authors. In reference to Table 3.1, it can be seen that during the time of the Fort's operation there were seven different Factors responsible for the Fort, and for keeping a record of daily activities and occurrences. Due to the varying personalities and interests of these men, they each wrote in a different manner and emphasized a diversity of facts. For example, there is a noticeable difference between two Factors - Francis Butcher and Henry Maxwell - as observed in the journals:

TABLE 3.2: Available historical documents from Fort Dunvegan

Journals

1806
Summer 1807 and Winter 1807-08
1822-23
1824-25
1828-1830
1834-35
1836-37
1837-38
1838-39
1839
1839-42
1842-43
1843-44
1844-45
1847-49
1853-55
1866
1874
1895-1900 (not analysed)

Correspondence Book

1838-39

Account Books

1832-33
1839-42
1841-42
1842-44
1844-45
1845-46
1850-51
1856-57
1857-58
1860-61
1861-62
1863-64
1864-65
1866-67

'Cost of Living' Chart

1828-29 (good)
1832-33 (good)
1835-36 (good)
1836-37 (condensed chart; not month by month)
1840 (only for month of July; incomplete)

Recapitulation of Furs

1828
1829
1830
1832-33
1841-42
1842-44
1844-45
1845-46
1856-57
1860-61
1863
1864-65
1866-67
1872-73

> Butcher had labored long and hard at Dunvegan, working continually in the interests of the company. His successor, Henry Maxwell, was of a different stamp. His attitude, as revealed in his manuscript journal ... was of one who could not care less. (Holmgren 1984:181)

The journals often did not provide the exact data needed with regards to comments concerning subsistence practices and patterns. The primary difficulty was that of vagueness -- such as authors being not specific when recording comments about receiving food from the Natives. For example, one area of interest pertinent to Hypothesis One was the determination of whether food brought to the Fort was by the Fort Hunters or by other Natives (i.e., Coincidental trade). Unfortunately, at times this information was vague, or else references were made to certain Natives, and it was necessary to determine whether they were one of the Fort Hunters or the other.

Another area of vagueness was in reference to the food itself. For instance, a statement like the one below was common:

> 16 May, 1841: ...The Croche arrived with a Small Animal killed by G. Oreilles. (HBA B.56/a/10)

It is not known, on the basis of this information, what small animal is being referred to. There are numerous instances of the use of the term "Animal" instead of a specific species. Moreover, it was unusual if this was qualified with the term 'small' or 'large'. This frustrated the collection of data concerning specific species and their constribution to the diet.

When meat, whether fresh or dried, was brought to the Fort it was usually weighed. This weight would be accompanied using a statement such as:

> 17 Dec., 1824: ...two men that left this one the 2nd Inst. for some dry Provisions that was left at Cadottes River by Gladue a freeman - they rendered here about 400 lbs Dry Meat Pounded Meat and Grease. (HBA B.56/a/2)

Weights were usually not exact, because the term "about" often accompanied the weight, and therefore any weights in this analysis are only approximate. In addition, instead of a weight being given, the Factor would sometimes simply state "some meat", or:

> 5 Dec., 1824: La Garde and La Freniere arrived with two Iroquois whose furs and Provisions I had sent them for, they gave me 100 Bvr [beaver] Skins and a little dry Provisions. (HBA B.56/a/2)

Based on the journals, "a little meat" could in some cases equal up to 400 lbs weight. Vagueness in the journals was thus a constant problem.

One final obstacle in this analysis was that many journal entries skipped days, or sometimes even months. While the emphasis here is on reconstructing past diet, it is difficult to do so when data for months at a time may be missing. In one instance, there were only about one or two entries per month. This limited information made it impossible to obtain a representative sample of days, or to record what animal species and in what frequencies were brought to the Fort on a regular basis.

Due to the above stated factors, and particularly because some journals were very incomplete, only a certain number were chosen for analysis. They are as follows:

1806: 18 April to 14 October
1822: 17 May to 31 December
1823: 1 January to 14 May
1824: 1 October to 31 December
1825: 1 January to 19 May
1838: 13 October to 31 December
1839: 1 January to 1 May; and 3 October to 31 December
1840: 1 January to 31 December
1841: 1 January to 31 December
1853: 14 November to 31 December
1854: 1 January to 31 December
1855: 1 January to 29 September

It should be noted that there are three main groupings of the journals. This was done with the aim of obtaining representative subsistence data from three main time periods: the 1820s, the late 1830s and early 1840s, and the 1850s.

One additional year, 1806, was also included in the analysis to examine the possibility of differing subsistence patterns in the earlier years of occupation. Fort Dunvegan had just been established at this time, and a great deal of reliance on the local native population for subsistence may have taken place. Also, the Fort began as a North West Company Post and after 1821 it became a Hudson's Bay Company Post. It was thought that there may have been differing subsistence patterns between the two companies.

Referring now to methods and analysis, each of the above-mentioned journals was analysed and the data pertaining to subsistence noted. The account books were also studied, and were particularly valuable. They included food consumed per month, the type consumed, and to whom the food was given.

RESULTS OF HISTORIC DOCUMENTARY ANALYSIS

Contract and Coincidental Trade of Provisions

Before discussing the three hypotheses, it is first necessary to define what is meant by Contract and Coincidental trade. These two types of trade have been identified in the Dunvegan journals, and it was found that they were significantly different with relation to what animal foods were traded.

Natives have played an extremely important role in the provisioning of forts over a long period of time in history, and this can be seen in historic documents as early as the middle 1660s (Thistle 1986:46). Their role was essential because many forts relied on the Natives for the majority of their food supply. In order to obtain a steady supply of food, forts regularly hired local Natives who were called their 'Fort Hunters':

> Most H.B.C. forts had at least one 'Fort Hunter' attached to them, whose duty it was to provide provisions for the fort. In addition there would be numbers of Indian hunters, equipped from the fort on credit, who hunted away from the fort, at their wintering grounds, chiefly for furs. (Rich 1938:64, note 1)

Not only did the HBC hire hunters but it appears that the NWC also hired hunters (Rich 1938:75) and fishermen. As providers of animals and fish the Natives "...provided a vital support to the permanent trading facilities by harvesting the food resources of the bush" (Janes 1975:97).

Thistle, in studying trade relations between the Indians and the EuroCanadians, found that rather than the believed situation where Indians depended on the EuroCanadians for trade goods, it was "...European dependence on Indians which characterized the early contact situation" (1986:45). In fact, he stated that the Cree Indians were able to maintain control over the EuroCanadians through the provisioning of food. "One area in which the Cree maintained control from the very first contacts with Europeans was in the provision of 'country produce'" (Thistle 1986:81). Through studying historic journals from Cumberland House, Thistle found that:

> ...in the two decades following the establishment of the post, the HBC depended increasingly on the Western Woods Cree furnishing them with "country produce". Their near monopoly on the supply of game animals for food was a significant means by which the Cree exerted their control over the trade relationship (1986:57)

When the Natives became Fort Hunters, they entered a contractural relationship with the traders. They were hired to provision the fort with food, and therefore established a formal agreement for contract hunting. This contract was likely a verbal agreement between the Factor and certain Natives, who exchanged meat in return for goods. For instance, an excerpt from the 1822 Dunvegan journal provides a glimpse into this agreement:

> 11 Dec., 1822: it may be proper here to Observe that when ammunition is sent to the hunters each hunter receives 1/2 pint of powder, 30 balls and foot tobacco and a flint, and quart of Rum for every 10 Animals they send to the House. (HBA B.56/a/1)

This agreement can be termed Contract trade/hunting. It established an obligation on both parties, but appeared to be flexible to a certain extent. These Natives were not required to trap for furs; their duty was primarily to hunt animals for food. Their role can be seen clearly in many fort journals, including those from Fort Dunvegan.

The journals also indicate that there was an additional source of provisions besides that obtained from the Fort Hunters. The HBC forts traded not only furs with the Natives, but also provisions including fresh, dried, and pounded meat, and grease. These latter provisions were essential for making pemmican, a vital food for the fur trade. Pemmican was often the prime source of food during trips away from the fort, and especially for when the furs were shipped east.

This trade of food, besides that of furs, has been identified by other researchers. Thistle (1986), in reference to Fort Hunters, stated that "Such wage labour for a few hunters was in addition to that of the many Cree who traded provisions as well as fur" (Thistle 1986:57). Also, Janes found that "...food was accepted as readily in trade by the EuroCanadians as were furs" (1975:95). In a faunal analysis conducted on an assemblage from Nottingham House, Rick (1983) discussed the fact that dried meat and pemmican, purchased from the Natives, would leave no archaeological correlate at the site. These researchers have all demonstrated the role of the food trade and its importance for the forts.

The trade of provisions provided a source of food beyond that which was obtained by the Fort Hunters. While the Hunters provided a reliable source of animals, the trade of provisions by other Natives was much more unreliable and random. Therefore the provisions trade, besides that conducted with furs, can be termed Coincidental trade. The term Coincidental was used precisely because food was brought to the fort on a coincidental basis. Usually, Natives would come to the fort to trade their furs; if they also brought a few provisions to trade, it was coincidental to the primary reason for coming to the fort. On the other hand, sometimes the Natives did not bring in furs at all, and only provisions. Indeed, personnel at the Fort would encourage the Natives to hunt for more provisions at the expense of fur trapping. This fact alone emphasizes the significance and importance of the Coincidental trade of provisions. What is not known, however, is the extent of the provisions trade. What is needed is a clearer picture of subsistence strategies performed at fur trade forts. An evaluation and analysis of the Fort Dunvegan journals can provide the information concerning the differences and amounts of food provided by Contract trade and Coincidental trade.

Hypothesis One

In order to determine the role that Contract and Coincidental trade played in the subsistence strategies of Fort Dunvegan, a detailed analysis of all incoming food to the Fort was conducted. A table was made recording every instance in which food was mentioned for each year of the journals selected for analysis (see p. 63). For each of these instances, it was noted whether the food was brought to the Fort by the Fort Hunters, or by other Natives (thus indicating Coincidental trade). These data were then quantified, and are represented in Figures 3.1 to 3.10.

The data were then quantified according to the Minimum Number of Individuals method, or MNI. Each animal or portion thereof brought to the Fort was recorded as one animal. For example, if two moose and a portion of one moose were brought in, the MNI would equal three moose. This method can exaggerate the number of animals and in turn the amounts of meat brought to the Fort, as it is unlikely that complete large mammals were returned to Fort Dunvegan. This situation can be supported on the basis of two factors. First, based on the Dunvegan journals, usually when a moose was brought in by the Hunters, its weight was often in the 300-400 pound range. However, live weights of moose can range between averages of 768 pounds for females and up to 1000 pounds for males (Banfield 1974:395). This suggests that the animals were being butchered and dressed in the field. Secondly, the Hunters were allowed certain portions of the kill for

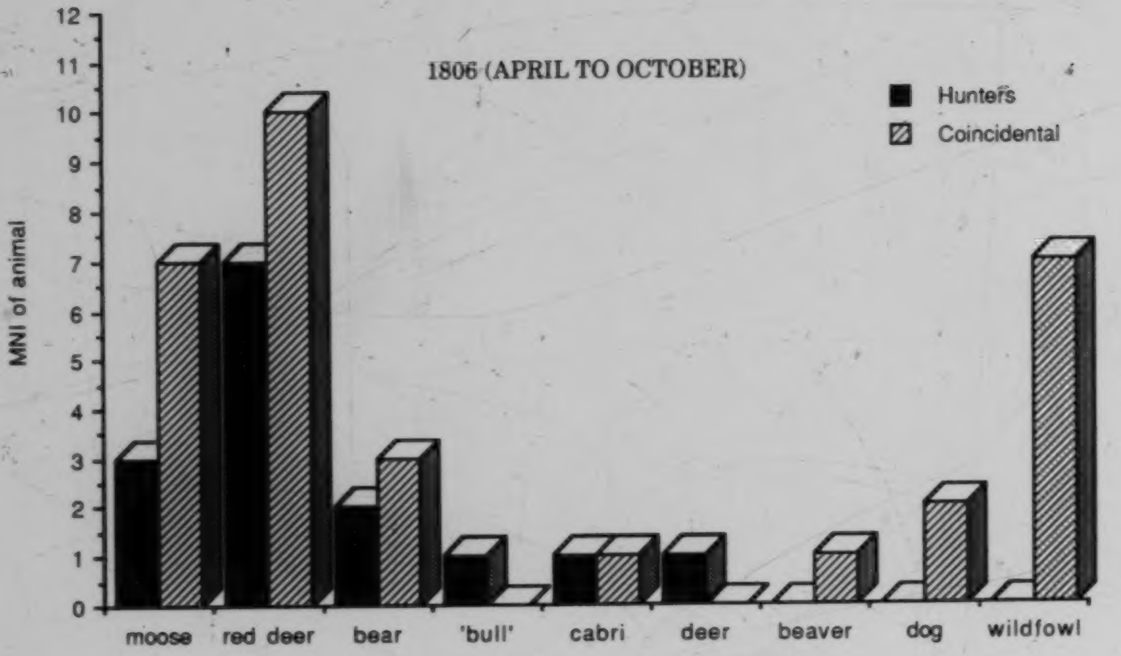


Figure 3.1 Minimum Number of Individuals of Animal Species based on 1806 Fort Dunvegan journal.

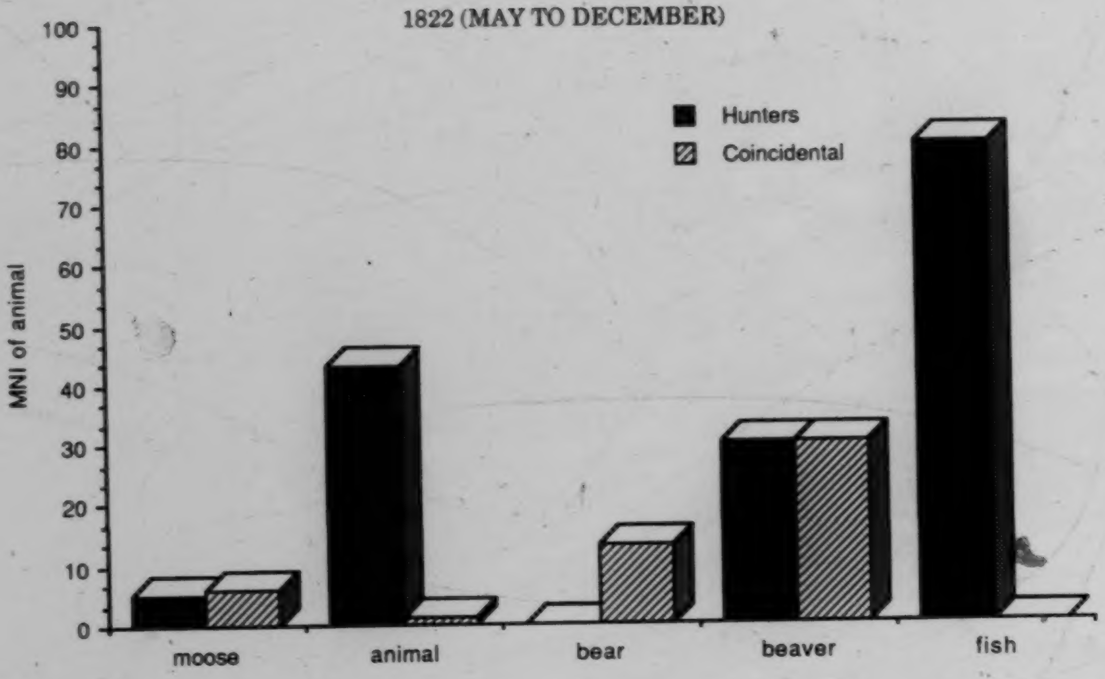


Figure 3.2 Minimum Number of Individuals of animal species beased on 1822 Fort Dunvegan journal

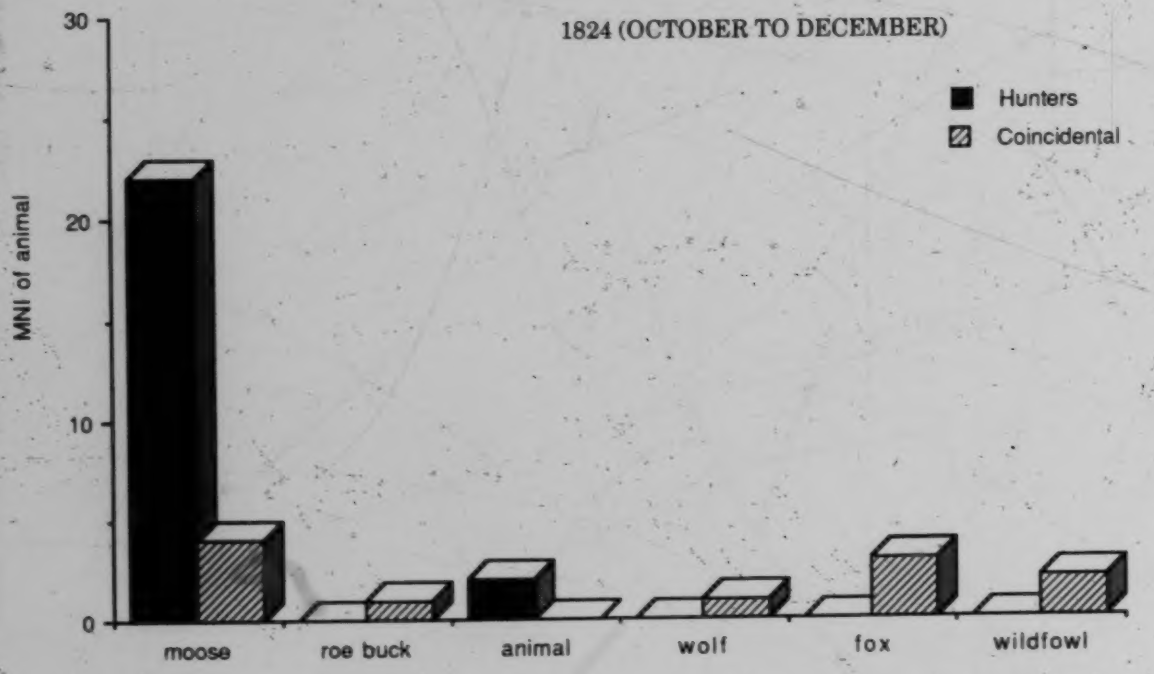


Figure 3.3 Minimum Number of Individuals of animal species based on 1824 Fort Dunvegan journal.

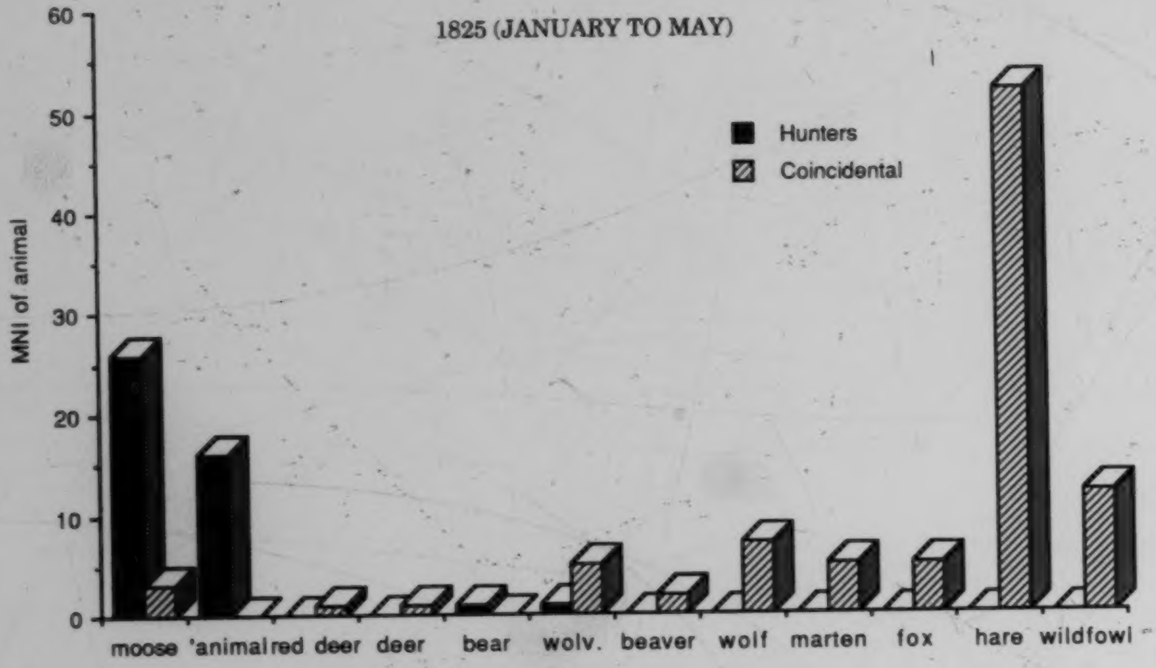


Figure 3.4 Minimum Number of Individuals of animal species based on 1825 Fort Dunvegan journal.

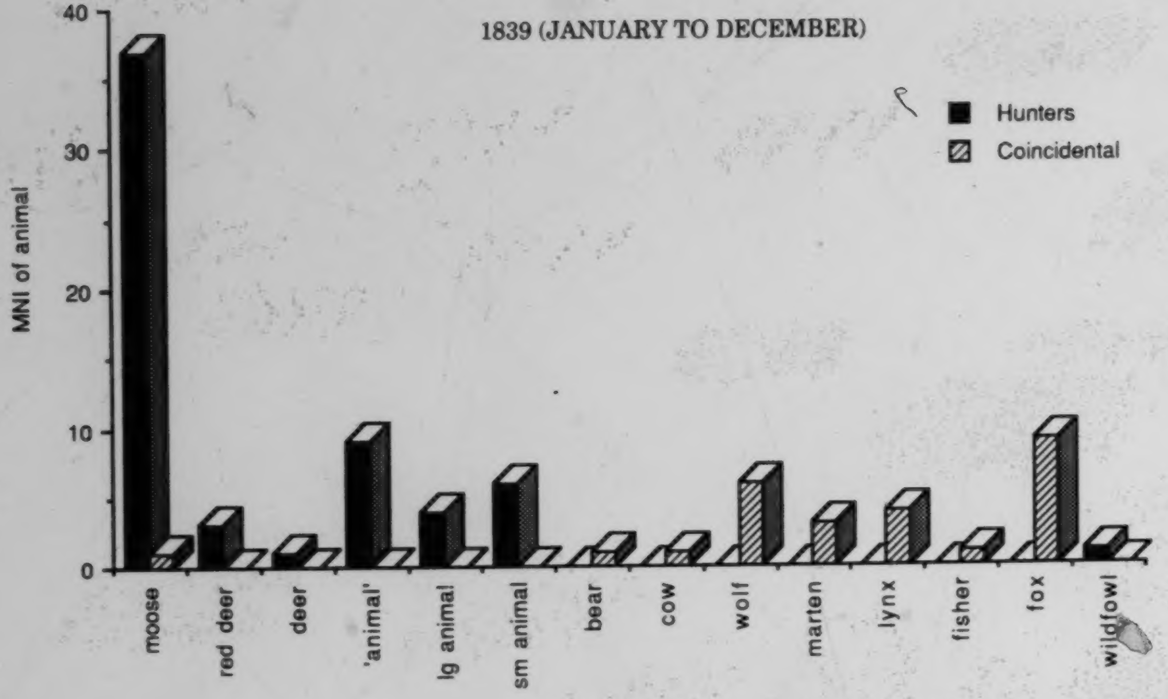


Figure 3.5 Minimum Number of Individuals of animal species based on 1839 Fort Dunvegan journal.

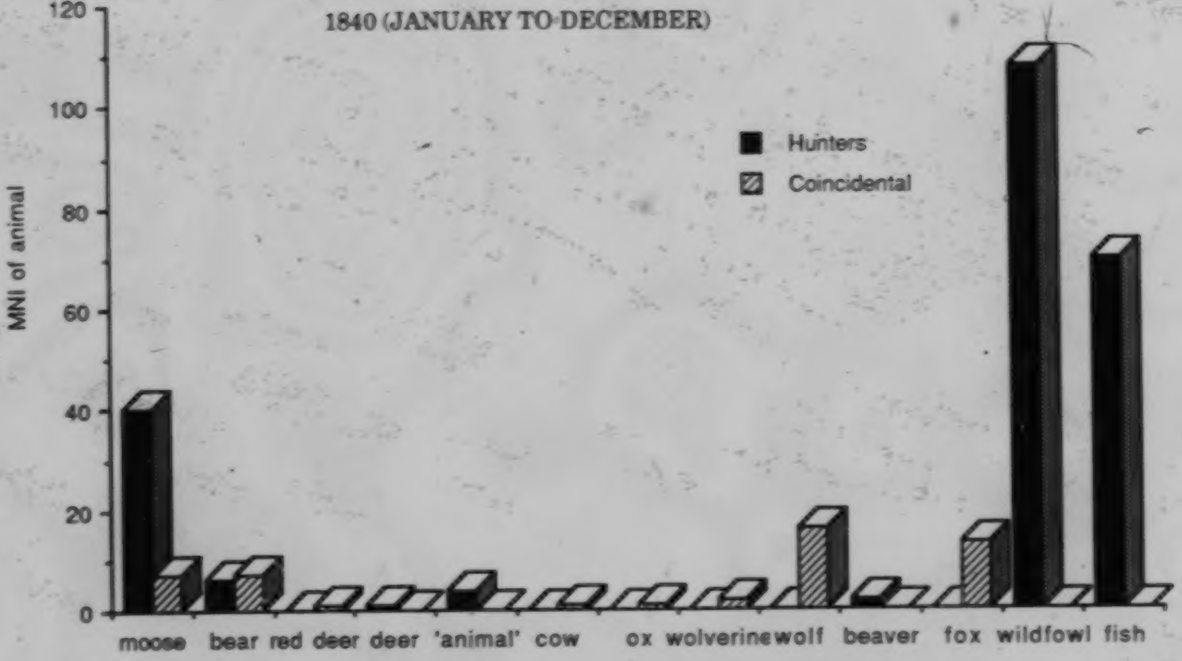


Figure 3.6 Minimum Number of Individuals of animal species based on 1840 Fort Dunvegan journal.

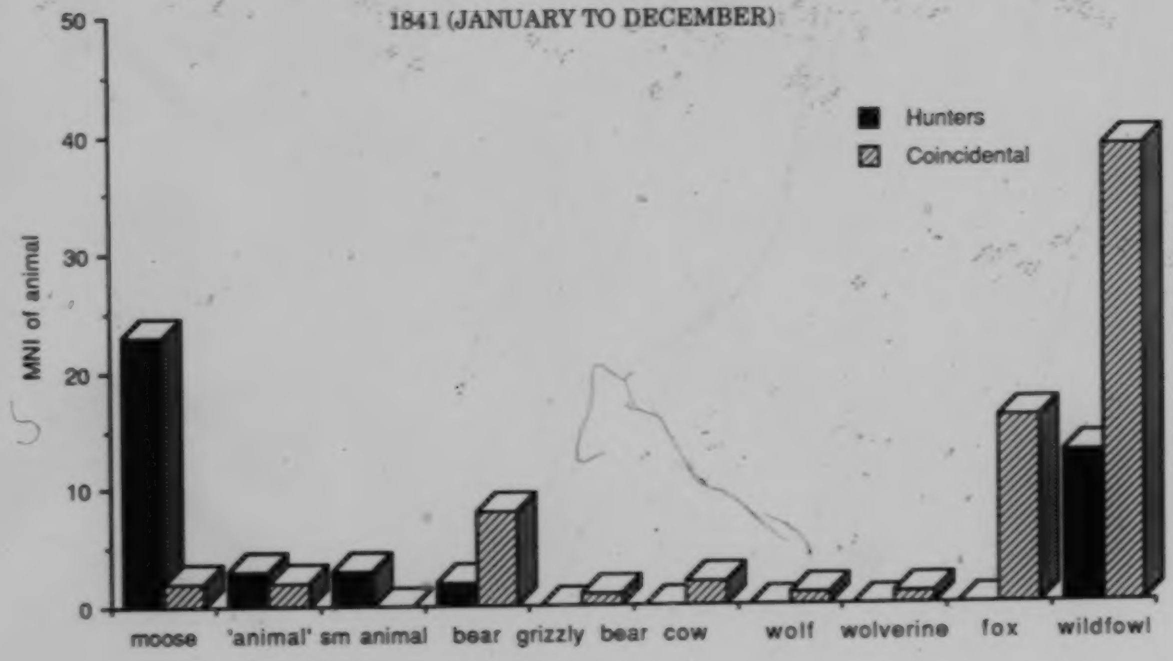


Figure 3.7 Minimum Number of Individuals of animal species based on 1841 Fort Dunvegan journals.

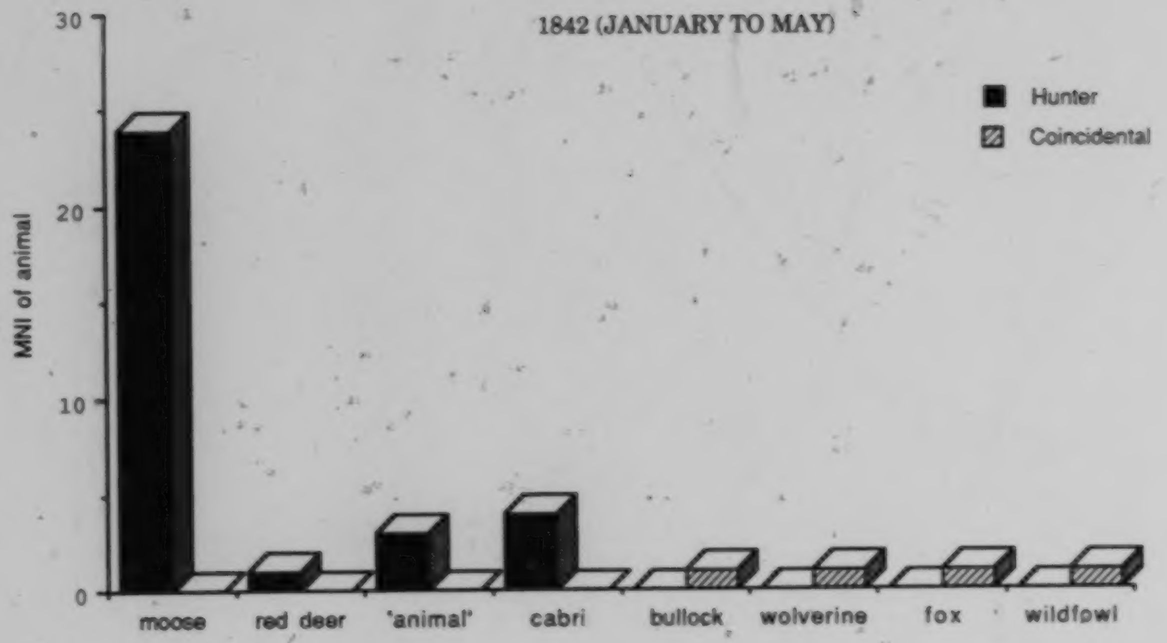


Figure 3.8 Minimum Number of Individuals of animal species based on 1842 Fort Dunvegan journal.

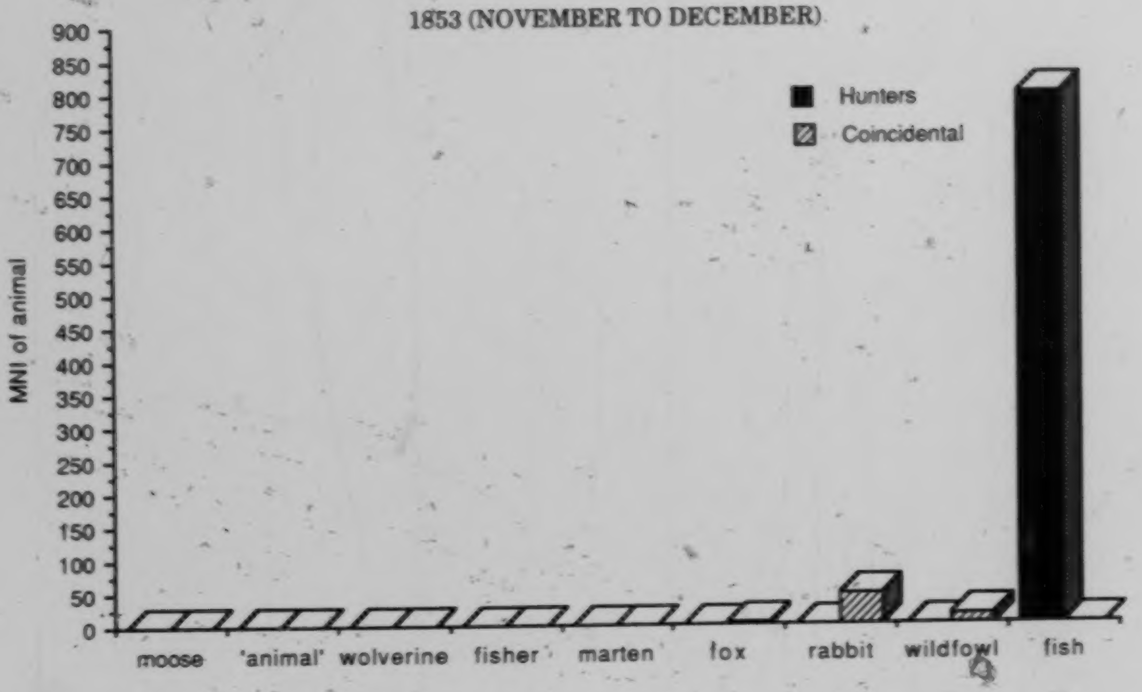


Figure 3.9 Minimum Number of Individuals of animal species based on 1853 Fort Dunvegan journal.

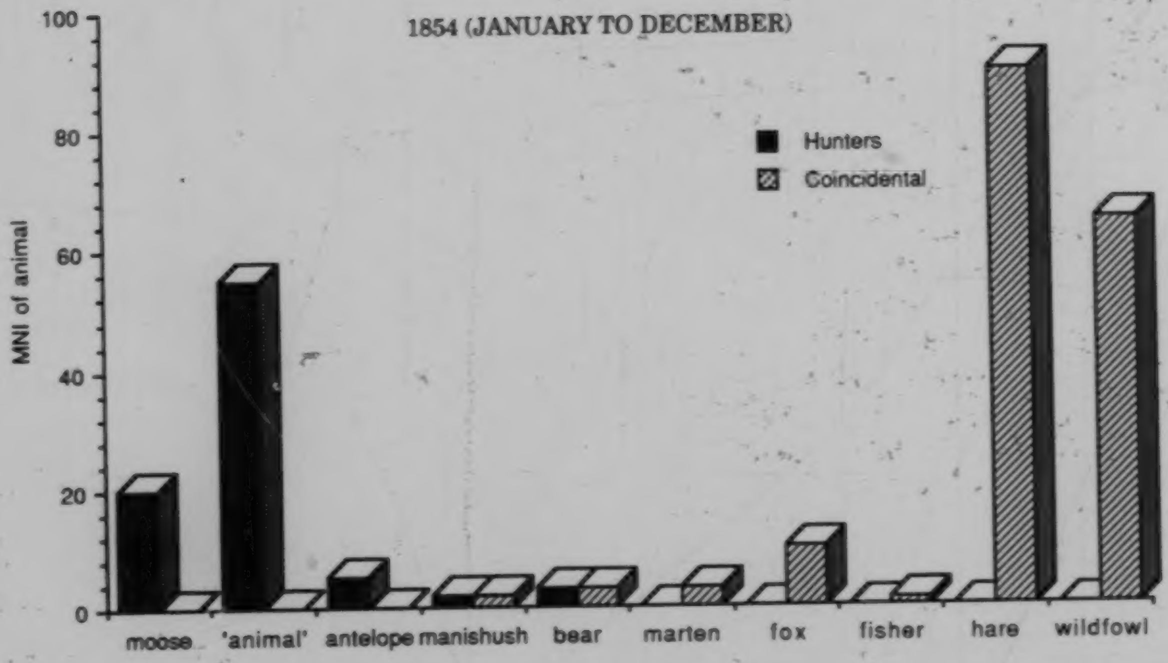


Figure 3.10 Minimum Number of Individuals of animal species based on 1854 Fort Dunvegan journal.

their own use. Therefore, except under unusual circumstances, complete large mammals were likely rarely brought to the Fort.

In addition to the above information, there were some data that could not be quantified according to the MNI method. This occurred because of the previously mentioned vagueness in the journals. As represented in Table 3.3, there were a number of statements that were vague with regard to specific amounts of provisions brought to the Fort. Statements such as "a little provisions", or "a horseload of meat", were common and at times frustrating for this specific analysis.

Finally, a brief word needs to be mentioned concerning the definitions of a number of the animals listed in these figures. Writing in the 1800s, the authors of the Dunvegan journals used several historic terms for animals that are not in use today. For instance, the term 'red deer' is an elk (wapiti), according to the *Dictionary of Canadianisms on Historical Principles* (Gage 1967). Other animal species that need to be defined include the 'cabri', which is an antelope (Gage 1967:104), or likely deer in this northern location. One term that could not be defined was the 'manishush'. Based on the context that it was found in, it is possible that it is a term used for a young animal. Examples from the journals serve to illustrate this:

> 11 March, 1854: Perdrix and two women arrived 4 Animals for us viz: 1 female, 1 Manishush, and 2 Males. Meat haulers off tomorrow morning. (PMAA 74.1/123)

> 25 March, 1854: About 10 AM the Meat haulers arrived with Bapte train, 246 lbs and Canada's 231 lbs of Mixed female, Male and Manishush Meat say 477 lbs total and several Skins in Cords. (PMAA 74.1/123)

Based on this context it is likely that a manishush is either a fetal animal or young animal killed along with the mother. However, this is not clear and it may be possibly another species altogether. The 1806 journal provided some problems during the analysis of Contract and Coincidental Trade. While later journals often made it clear

TABLE 3.3: Non-quantifiable food received from Hunters and Coincidental trade at Fort Dunvegan

YEAR	HUNTERS	COINCIDENTAL
1806	none	-984.5 skins in meat and/or provisions -1254 lbs of dried and pounded meat -170 lbs grease -5 sledges of provisions -provisions -provisions -provisions -a little meat -a little provisions -a little provisions
1822	-2450 lbs fresh meat -12 horse loads of provisions, equaling 2200lbs -2000 lbs seasoned provisions(?) -"sent a supply" of provisions -a little meat from caches	-greater than 1300 lbs fresh meat -2000 lbs provisions -1000 lbs seasoned provisions -100 lbs grease -a little grease -a little seasoned provisions -some seasoned provisions -some seasoned provisions -a little seasoned provisions -8 horse loads of seasoned provisions -a bale of provisions -a little provisions -"tolerable hunts"
1823	-12,340 lbs fresh meat -a load of seasoned provisions -several men with meat -good loads -good loads -good loads -10 men arrived with loads of fresh meat -11 men with fresh meat -6 men with good loads -7 men with meat -4 men with a little meat -4 men with good loads -7 men with ordinary loads -5 men with a little fresh meat -4 men with meat -6 men with meat -6 men with a little meat -8 men with meat (equals end of caches)	-3500 lbs fresh meat -200 lbs dried meat -900 lbs pounded meat -some pounded meat -some seasoned meat -a little seasoned provisions -some grease

TABLE 3.3, Con't

DATE	HUNTERS	COINCIDENTAL
1824	-1366 lbs fresh meat -some dry provisions (equals 400 lbs dry, pounded, and grease) -some fresh meat	-a little dry Provisions (equals 400 lbs) -alittle dry provisions -a little dry provisions -a little dry provisions -a little dry provisions -some dry provisions -some dry provisions -a little provisions -provisions
1825	-12,772 lbs fresh meat -a few geese and ducks -some wildfowl -a few wildfowl -some wildfowl -some fresh fish (a kind of chub)	-180 lbs fresh meat -150 lbs dry provisions -a little pounded meat and grease
1838	-871 lbs fresh meat	-tolerable success of hares -8 M.B. foxes -a couple foxes -a couple lynxes -a little provisions
1839	1893 lbs meat	-hares -some scraps of meat -170 lbs grease -a little grease -a little provisions -a little provisions -a little provisions -provisions -provisions
1840	-350 lbs meat -meat hunters - pretty good loads -a few Fowl and Eggs -a little half-dried meat	-a good many fish ('Lachy') -horse killed to feed the dogs -a little dried and pounded meat -some pounded and wretched poor dried meat -some very poor dried and pounded meat -some poor provisions -a little provisions -a little provisions -a little provisions -a little provisions -a good hunt of provisions

TABLE 3.3. Con't

DATE	HUNTERS	COINCIDENTAL
1840, con't		-a little provisions -provisions -a little poor provisions -a little provisions -sent in some provisions -a little provisions -the Indian's provisions -a little provisions -more provisions -more provisions -3 horse loads of provisions
1841	-1473 lbs meat -good loads of meat	-meat -a little pounded meat -a little pounded meat -a little pounded meat -a little poor dried meat -a little good provisions -some pretty good provisions -a little provisions -provisions -a little provisions -a little provisions -provisions -a little provisions -some good provisions -a little provisions -a little provisions -provisions -very little provisions -some provisions
1842	-1094 lbs meat -cached meat	none
1853	none	none
1854	-4147 lbs fresh meat -fish -meat -a few loads	-9 dead cows -2 horses dead and fed to dogs -dried meat -dried provisions hunt -dried provisions -a little dried meat
1855	-180 lbs fresh meat	-mention of killing rabbits, grouse, and ducks by personnel of the Fort

who was bringing in the animals (i.e., the Hunters or the Natives), this one was often unclear. It is possible that the Fort did not hire Fort Hunters during 1806, and that it merely encouraged the Natives to bring in food when they could. This factor could be a difference between the NWC and the HBC, because this journal represents activities performed by the NWC as opposed to the other journals which are HBC records. It is possible that contract hunting was not established at this time, and that it may have developed in later years.

Before discussing the following figures, two points need to be clarified. The first point concerns Figure 3.1, where under Coincidental trade several small mammals and wildfowl were traded. What should be noted is the utilization of dogs for subsistence. The dogs, belonging to personnel at the Fort, were eaten during a period of severe food stress. These instances were rare, but were included under the heading Coincidental trade because they were not provided by the Fort Hunters.

Other animals kept at the Fort were also considered to be Coincidental food sources, as opposed to those provided by the Hunters. In some of the later journals, there were domestic cows and bulls kept at the Fort. The cows were kept to produce milk and there is evidence of butter being shipped to other forts. For example, in May 1842 there is a reference of 445 pounds of butter being shipped to Fort Chipewyan (see Appendix A). At times, cows died from diseases, from attacks by wolves, or from severe climatic conditions. In other instances they were killed by the residents of the Fort when other food sources were low or non-existent. When consumed at the Fort these animals were considered to be coincidental. The animals were not meant to be killed to be a food source, but rather were kept as work animals or for their by-products (milk/butter). Therefore, if they were consumed it was supplemental to the EuroCanadians regular diet of food from the Hunters. Figure 3.8 demonstrates this situation.

Figure 3.1 represents what animals were brought to Fort Dunvegan in the months of April to October, 1806. As demonstrated in the histogram, the Hunters (Contract trade) brought primarily large mammals into the Fort. These included moose, red deer (today known as wapiti), bear, deer and a 'bull'. This 'bull' is likely a male moose, although it could be a male bison. While there were no specific instances of bison being killed and brought back to be consumed, there were instances in the journal where individuals would go on bison hunts to a nearby lake. Therefore, it is possible that this reference could imply a bison. Referring to Coincidental trade for this year, a number of large mammals, with the exception of deer, were also brought in. What should be noted, however, is the trade of smaller mammals and birds, notably wildfowl and beaver.

Looking at trends, in Figure 3.1 just as many if not more large mammals were brought to the Fort through Coincidental trade as from Contract hunters. In addition, smaller mammals and wildfowl were also brought in. This trend of bringing in smaller mammals can be seen in later journals. For instance, Figure 3.3 represents species brought to the Fort during the months of October to December, 1824. While the Hunters brought in only large mammals, particularly moose, the Natives brought a wider range of species including foxes and wildfowl through Coincidental trade. This trend can also be seen in Figure 3.4, which represents animals brought to Fort Dunvegan in 1825. Moose was again the most frequently utilized large animal and was most often brought in by the Hunters. The Hunters also brought limited numbers of bear, wolverine and wildfowl. Also noteworthy is the number of "animals" which were brought by the Fort Hunters. While it is impossible to determine the species of these animals, it is generally assumed that they were large mammals because the weights that sometimes accompanied the occurrence of "animal" in the journals indicated larger-sized animals. The trend is therefore that Hunters brought primarily large mammals and limited numbers of other mammals.

With reference to Coincidental trade, the trend continues in that while some large mammals were brought to the Fort, there were also medium-to small-mammals and some wildfowl. Referring again to Figure 3.4, the high frequency of hare brought to the Fort is notable. Some of the animal species, including the hare, were considered as Coincidental trade although they were killed by personnel living at the Fort. It appears personnel used free time to go hunting, particularly for wolverines, martens, and hares, and other small mammals. A number of these species were killed for their furs, but they may also have been consumed as well, especially the hares. These species were therefore included under this analysis because even if they were not consumed their bones may be found on site. Also, the animals killed by residents of the Fort were included under coincidental trade because they were extra to those supplied by the Fort Hunters. While Fort Hunters were expected to supply all animal food to the residents, any additional amounts of food were supplemental to the expected diet and they were thus coincidental to what the Fort Hunters supplied.

The data from Figure 3.5 are among the most interesting, as there is a bimodal distribution with peaks of large and small mammals. Large mammals were provided by the Fort Hunters, while medium to small mammals were provided through Coincidental trade. This is also clearly evident in Figures 3.8 and 3.10, and this trend is therefore indicative of a long-term trend.

In the months of November and December, 1853, it is evident that there were very few large or medium-sized mammals killed (see Figure 3.9). However, at that time there was a fishery and it appears that fish was a major food source during these two months. Rabbits and wildfowl were obtained through coincidental trade to supplement the diet.

Figure 3.10 also demonstrates a bimodal distribution of animals for the year of 1854. A great number of large mammals were supplied from the Fort Hunters, while a high number of small mammals, in particular the hare, and wildfowl were obtained through coincidental trade.

It can thus be seen that there was a distinctive pattern of subsistence for the residents of Fort Dunvegan. This pattern involved what animals were brought to the Fort through both contract and coincidental trade. The Fort Hunters hunted primarily large mammals, especially moose, and also wapiti and deer. As opposed to this, medium and small mammals and wildfowl were brought to the Fort through coincidental trade. This pattern is important, as it can have repercussions in terms of the interpretations made on the basis of the archaeological faunal assemblage. For instance, large mammals butchered in the bush by the Fort Hunters would be treated in a specific fashion that allowed the Hunters to have certain portions of these animals for themselves;the remainder to be brought to the Fort. This is evident in the following exerpt:

> 11 Dec., 1822: The men at the Hunters tent are restricted to eat the Head, neck and Boss, the rest of the animal is placed in security - that is the Skin, 2 thys, 2 sinews, 2 shoulders, 2 sides of Ribbs, 1 Rump, 1 Brisket, 1 Heart, 1 Belly, the inside fat and Blood when it can be collected. (HBA B.56/a/1)

This system would result in a particular pattern of faunal remains. For instance a faunal assemblage from a Hunter's camp for Fort Dunvegan would contain a high frequency of large mammal skulls, cervical vertebrae, and some thoracic vertebrae. At the same time, the journals indicated that Natives would also bring large mammals to the Fort in certain instances. In this case, there would have been no rules in terms of which animal portions had to be brought to the Fort and which portions could be consumed by themselves. It is more than likely that only portions of animals were brought to trade, rather than complete carcasses and it likely occurred on occasions when the Natives had extra meat to trade. Thus there would be potentially random parts of animals accumulating in the archaeological assemblage which could complicate the pattern of remains resulting from the activities of the Fort Hunters. Therefore Contract hunting and Coincidental trade had certain effects concerning what was deposited as refuse at the site. The two forms of trade can result in potentially different assemblages; the problem is that they may be blended in a fort situation and therefore be difficult or impossible to separate.

Interpretations made from the faunal assemblage also will not indicate the different forms of trade. Without journals to help clarify it would not be known that these trade patterns already existed. In general, archaeologists may assume that some food was obtained from the Fort Hunters while the Fort's residents provided the rest. Cultural interactions between other natives and the personnel of the Fort, such as through coincidental trade, would not be evident. The trend may not be self-evident, and it will be tested on the Dunvegan faunal collection in the next chapter. Also, these interactions are especially important when an analysis is made of other foods which the natives traded, including preserved forms of meat, rather than just fresh meat. This will be discussed in more detail in Hypothesis Two.

Hypothesis Two

While the data discussed in Hypothesis One involve primarily animal remains brought in fresh to the Fort, the data to be covered in this second hypothesis concern animal remains which were processed before they were brought to the Fort. The remains include dried and pounded meat, and grease. All three forms of provisions have no archaelogical correlates as there would have been no preservable portions, which would indicate to an archaeologist that these remains were consumed at the Fort. Rick (1983) identified this problem and stated that more research is needed in this area, particularly the "...dietary contribution of boneless or partly boned meat" (Rick 1983:264).

Table 3.3 represents non-quantifiable data involving food received from contract and coincidental trade at Fort Dunvegan. As can be seen, a large percentage of these data are 'provisions' including dried meat, pounded meat, and grease. There is also some fresh meat that could not be included in the histograms in Figures 3.1 to 3.10 because the specific species were not known. A great deal of the above data were non-quantifiable because the amounts given were too vague. For instance, it was not possible to determine whether "some" and "a little" were comparable amounts. This was particularly the case when an attempt was made to compare amounts of provisions between the years. Because there were different journal authors, there were individualistic descriptions of amounts of food. For example, the description "a little seasoned provisions" by one author may have meant something entirely different to another author.

The food listed in Table 3.3 is in addition to that which was given in Figures 3.1 to 3.10. Three distinct points can be made concerning the data in this table. First, referring to the food received from the Fort Hunters, almost all of it was fresh meat. A common scenario was as follows: once an animal was killed the Hunters sent someone to inform the Fort of the kill, and to send out meat carters to retrieve the carcass(es). A good example of this situation can be seen for 1823, where there were numerous instances of several men (up to ten) who returned to the Fort with loads of meat. This refers directly to cases where Fort Hunters sent in word that they needed help, and Fort personnel were dispatched to bring home the meat. An alternative situation occurred when meat was periodically cached. Later, individuals were sent to retrieve it when the meat was required. This situation can be seen in the last entry for the year 1823 from Table 3.3, in which the statement "end of caches" infers the presence and utilization of caches. Finally, some food received from the Fort Hunters was in the form of 'provisions', meaning either dried meat, pounded meat, or grease, or any of the above combined. It was infrequent, however, to receive the preserved provisions from the contract Hunters.

The second point that can be made regarding the data in Table 3.3 concerns coincidental trade. The majority of the food received through coincidental trade was in a preserved form. This was particularly the case for the years 1840 and 1841. Greater amounts of preserved provisions were received through coincidental trade than from the Fort Hunters. Provisions at times could equal well over 2000 pounds for one instance; such as in 1822. It appears that the Hunters supplied short-term food (i.e., fresh meat to be consumed almost immediately) and the other natives provided long-term food (i.e., that which could stay preserved for long periods of time and could be consumed at a much later date). The situation was that while fresh meat could be put in the ice-house to be kept for a while, it could quickly spoil if the weather conditions warmed significantly. As opposed to this, dried and pounded meat could be kept almost indefinitely as long as it was kept dry.

The third point concerning the data in Table 3.3 also involves the dried provisions. It appears that a great deal of provisions, sometimes well over a thousand pounds at a time, were traded at Fort Dunvegan. None of these provisions would be reflected in the archaeological record. Percentages of amounts of fresh meat and preserved meat could be determined from the weights. In 1832-33, 88.0% of the meat consumed was fresh, while the remaining 12.0% was either dried meat, pounded meat, or grease. In 1840, 81.9% was fresh meat while 18.1% was dried or pounded meat, or grease. Overall, it appears that 80% to 90% of the diet was fresh meat, while the remaining 10% to 20% was either dried meat, pounded meat, or grease. However, with relation to food value the dried and/or pounded meat likely could be much more higher than the fresh meat. For instance, one pound of dried meat could equal five pounds of fresh meat, hence the value of dried and pounded meat could have been higher than 20% of the diet. The officers and engagés (employees of the fort) and their families consumed between 85% to 98% of the fresh meat. Because so much preserved meat was coming into Fort Dunvegan but most was not being consumed on site (based on the account books), it is likely that the preserved meats and the grease were combined to make pemmican (to be consumed later when away from the Fort).

Figures 3.11 to 3.15 represent the expenditure of provisions covering a number of years from Fort Dunvegan. The data from these years were the only information available from the archives. The provisions are divided into four categories - fresh meat, dried meat, pounded meat, and grease. In addition, weights are given for each of the categories in relation to whom it was given to for consumption.

Figure 3.11a demonstrates the food consumed in the year 1828/29. The first point that can be observed is the large amount of fresh meat which the engagés consumed. This far exceeded that consumed by officers and their families. While the number of people consuming the meat is a factor (i.e., more engagés than officers), it can also be said that the engagés consumed more because of the heavy demands of physical activity placed upon them. Figure 3.13a also demonstrates this trend.

Referring to food provided for the voyages, the majority of the meat was in a preserved form. For the years 1836-37 and 1840, only dried meat was given to the men for voyages. At other times, pounded meat and grease were also provided. It is interesting to note the year 1832/33 (Figure 3.12a), when more fresh meat was given than preserved for the voyages. It is likely that this meat was provided during the colder winter months because it would stay frozen and not spoil (voyages in the winter were with sleds). However, fresh meat would have substantially weighed more, because of the bones, and would have been more of a hindrance than dried meat.

Food was also provided to strangers visiting Fort Dunvegan, to "Indians", and to the dogs. The "Indians" were likely natives who came to the Fort begging for food in conditions where starvation was imminent. Dogs also consumed a great deal of meat, a situation which could have added the stress of supplying large amounts of food by the Fort,

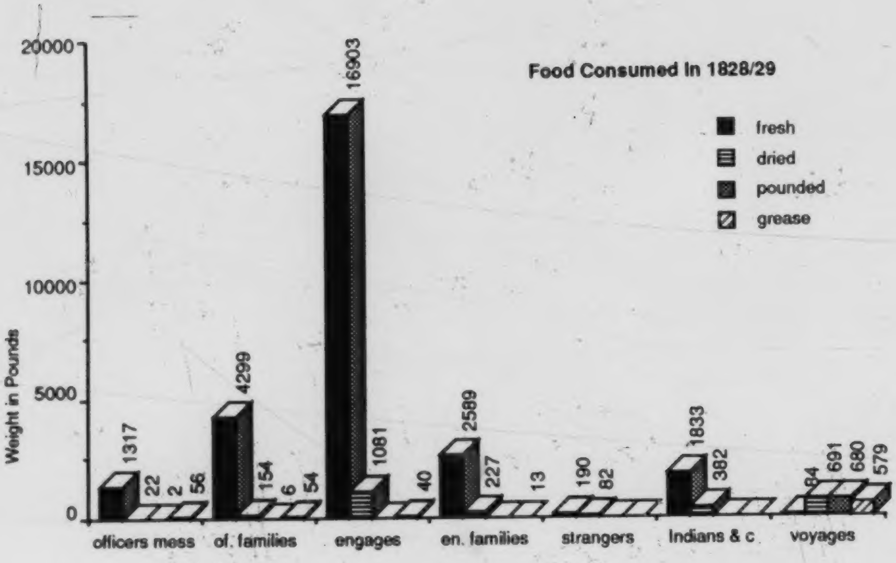


Figure 3.11a Fort Dunvegan meat consumption 1828/29

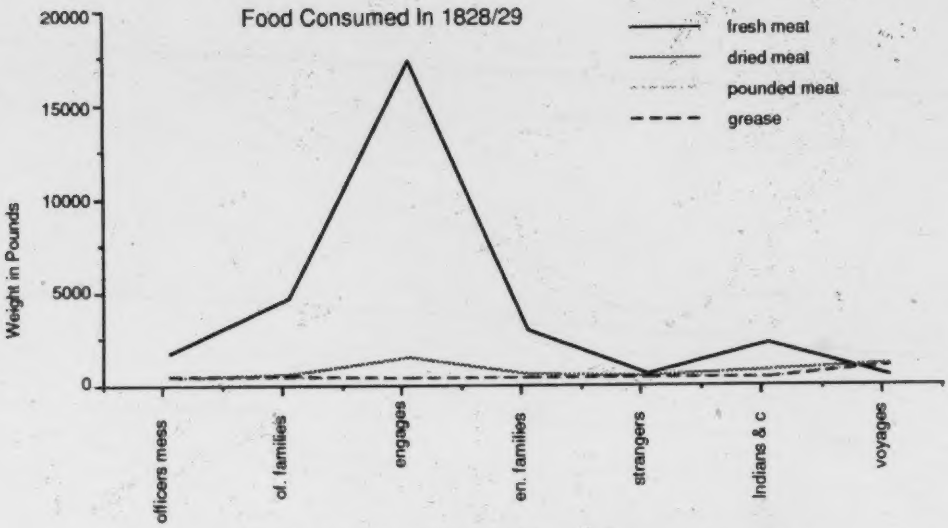


Figure 3.11b Fort Dunvegan meat consumption 1828/29

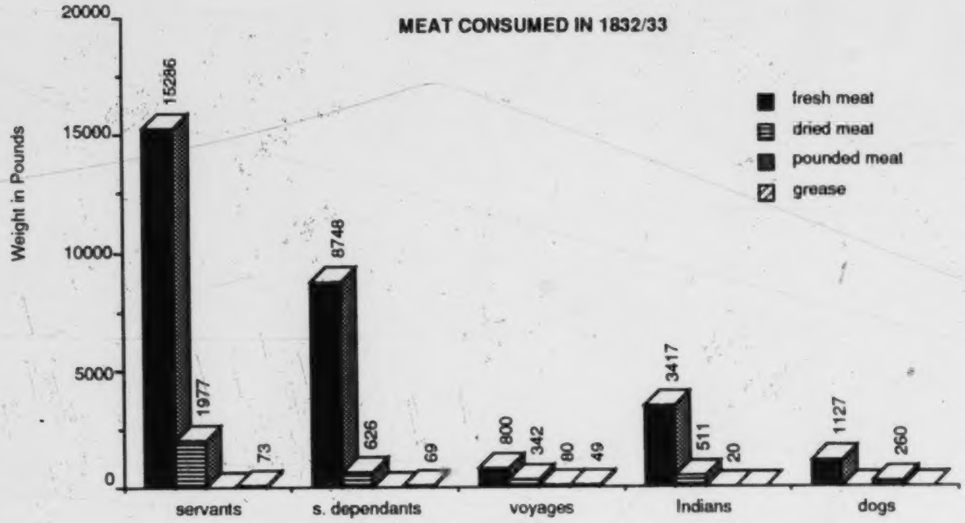


Figure 3.12a Fort Dunvegan meat consumption 1832/33

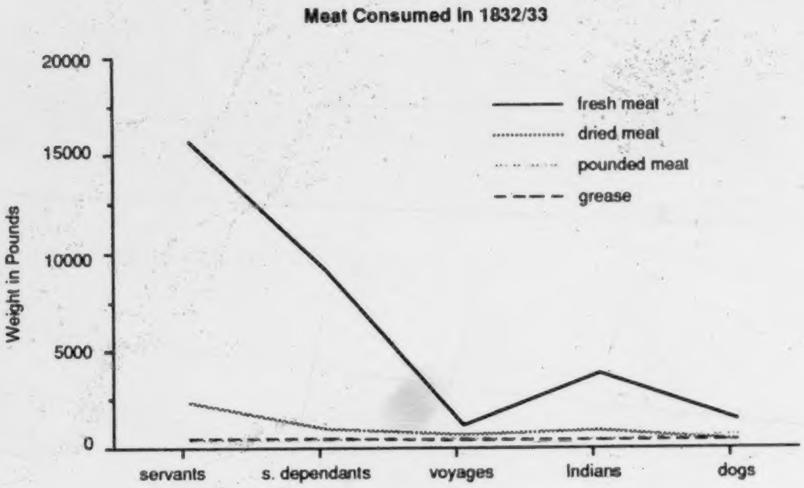


Figure 3.12b Fort Dunvegan meat consumption 1832/33

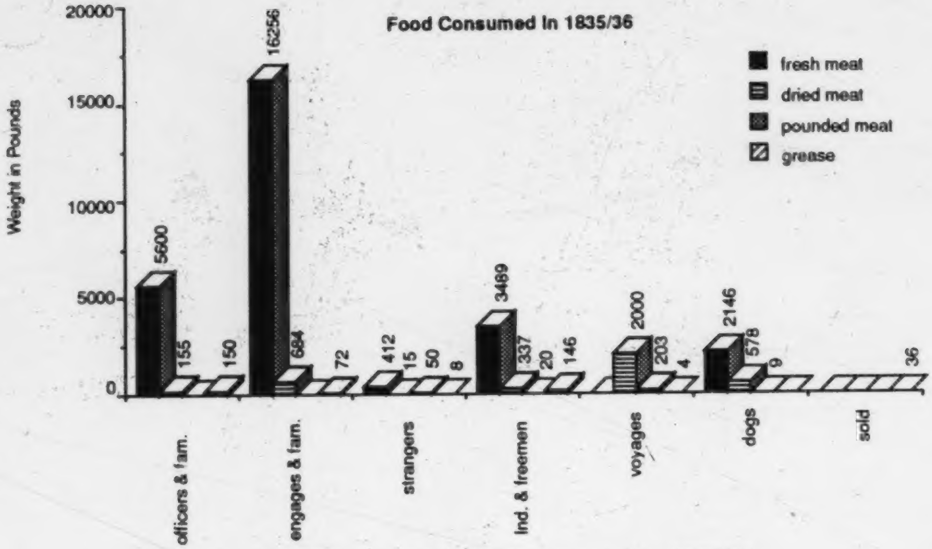


Figure 3.13a Fort Dunvegan meat consumption 1835/36

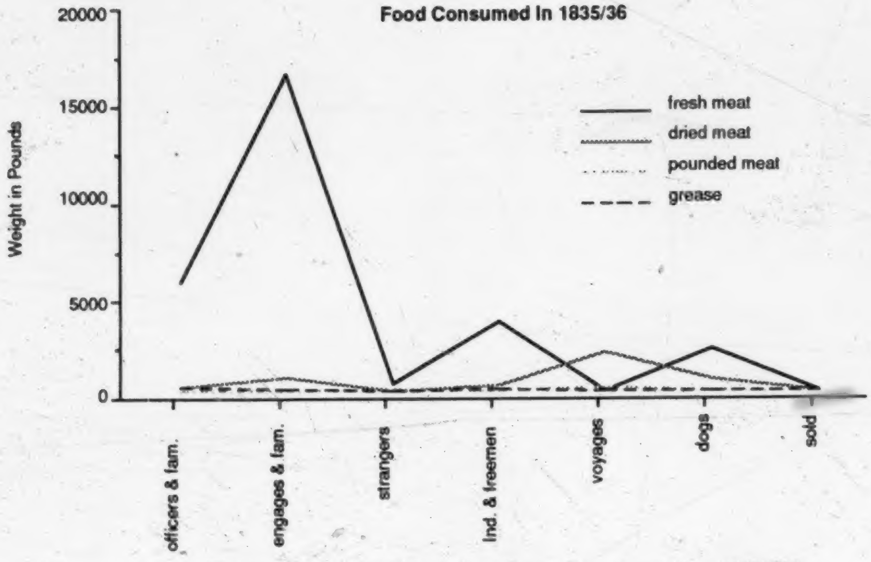


Figure 3.13b Fort Dunvegan meat consumption 1835/36

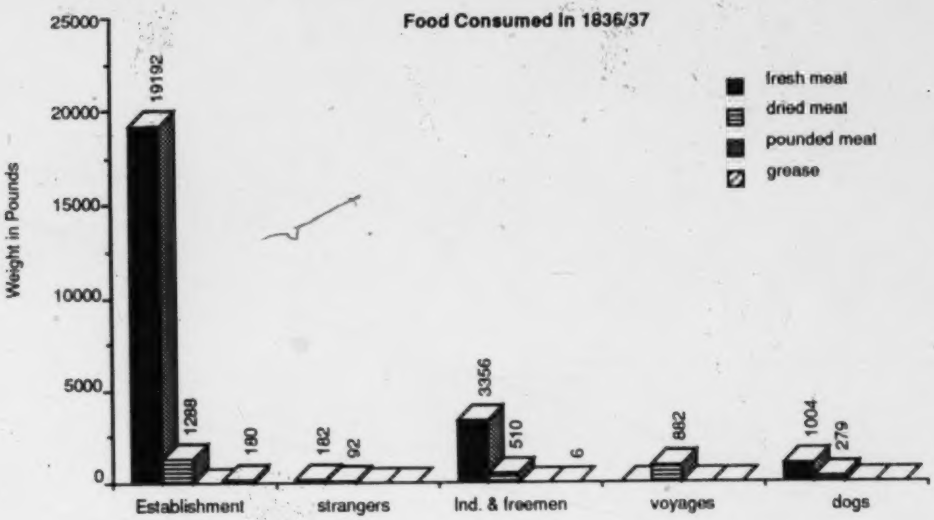


Figure 3.14a Fort Dunvegan meat consumption 1836/37

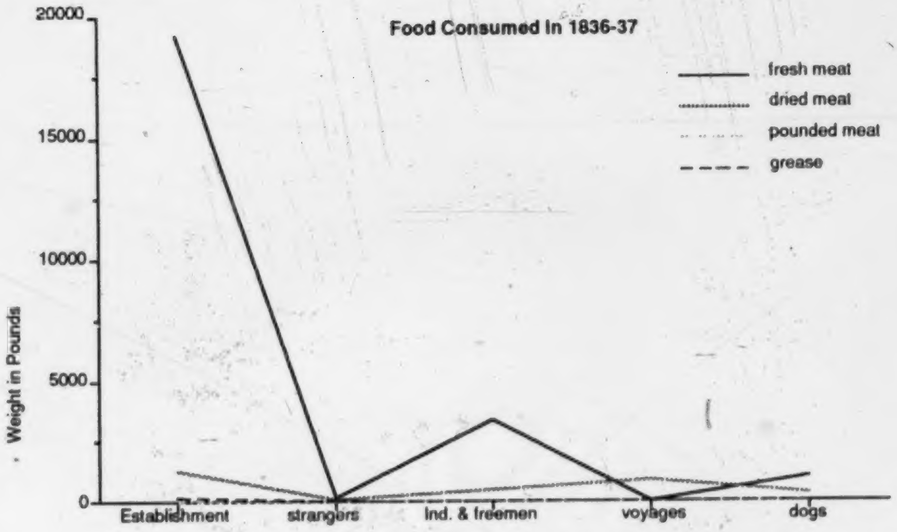


Figure 3.14b Fort Dunvegan meat consumption 1836/37

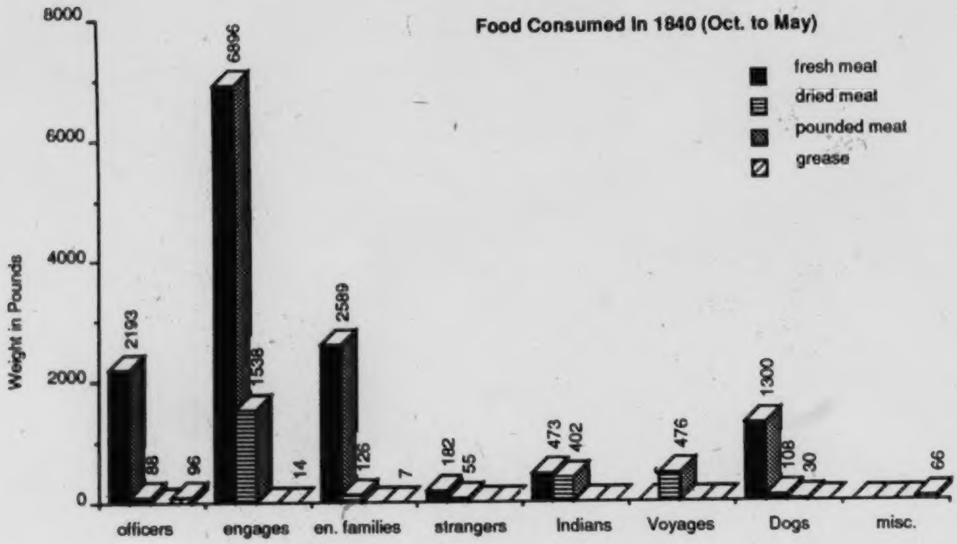


Figure 3.15a Fort Dunvegan meat consumption 1840

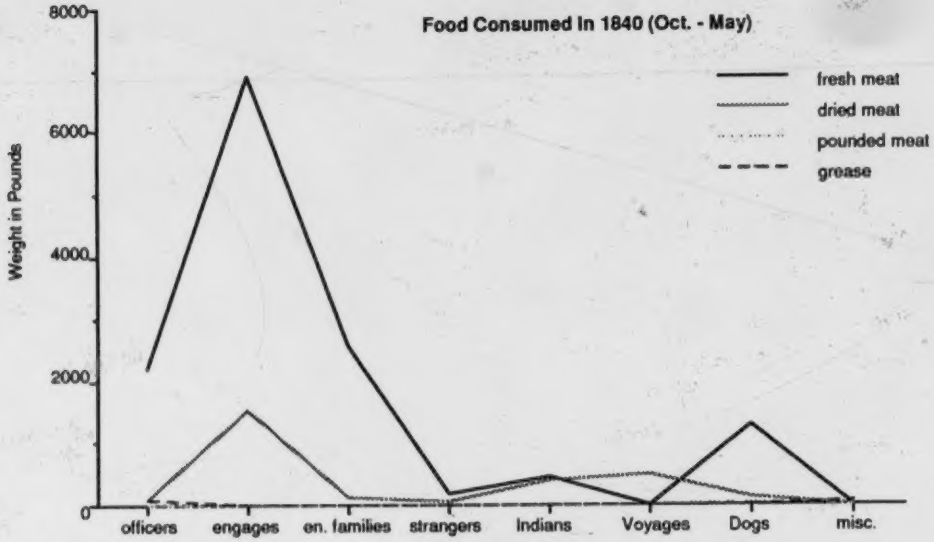


Figure 3.15b Fort Dunvegan meat consumption 1840

but without the dogs travel in the winter would have been severely restricted. Thus overall the amount of meat consumed varied a great deal at Dunvegan, because it depended not only on the population living there but also on the number of visitors, on the natives requiring assistance, and on the number of dogs.

Figures 3.11b to 3.15b represent the same data as found in the previous five histograms, but in a line graph format. By utilizing this format some trends can be seen which were not as clear in the histograms. The primary trend is represented in all five line graphs, and it concerns the amounts of fresh meat given to the Indians, to the voyages, and to the dogs. In general, the amounts of meat were high for Indians, were significantly lower for voyages, and were high for the dogs. The opposite trend is evident with reference to pounded meat: low amounts were given to the Indians, high amounts given for the voyages, and low amounts given for the dogs. A subsistence trend is thus evident on the basis of the available documentary data. While people of the Establishment consumed the majority of the provisions (including fresh meat and its more preserved forms), it is evident that fresh meat and pounded meat were consumed by strangers, by Indians and by the dogs in specific patterned amounts.

Two line graphs (Figures 3.16 and 3.17) illustrate food consumed at Fort Dunvegan on a month by month basis. They are for the years 1832/33 and the years 1835/36. Several similarities between the two graphs are evident. The first point of similarity concerns the month of November in both graphs. During this month the amount of fresh meat consumed severely decreased and at the same time the consumption of dried meat significantly increased. Provisioning the Fort, situated as it was in the boreal forest, was precarious because of the two particularly difficult periods of time, spring break-up and the fall freeze-up. The presence or lack of snowcover at these times was also important for sled travel. Travel during these periods was highly restricted. It is possible that these two graphs reflect the fact that individuals were not able to travel to

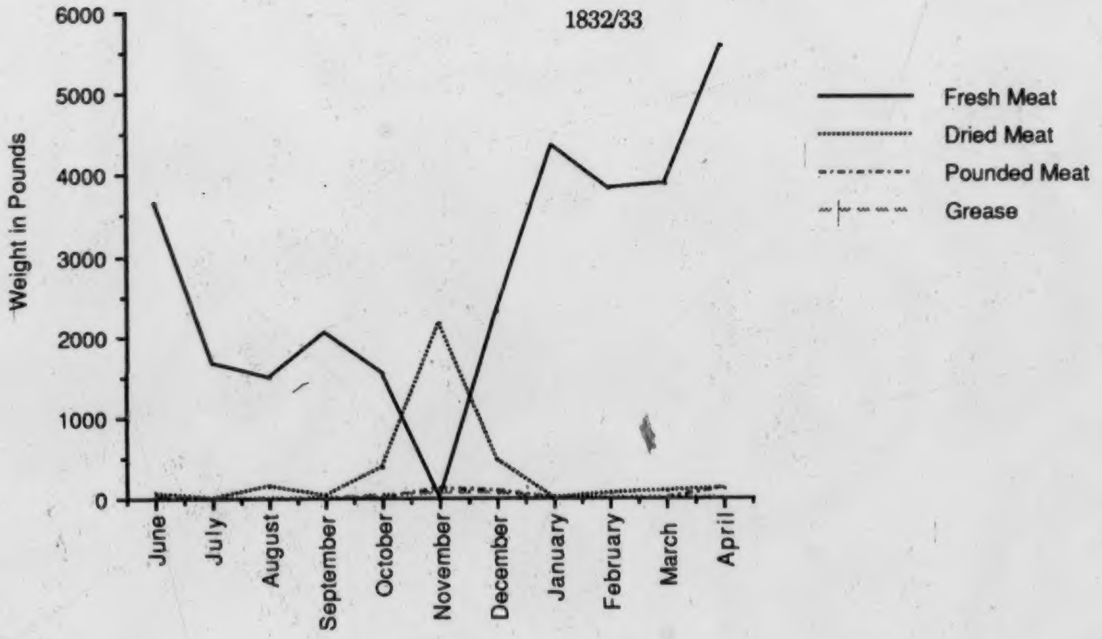


Figure 3.16 Fort Dunvegan meat consumption in 1832/33 on a monthly basis

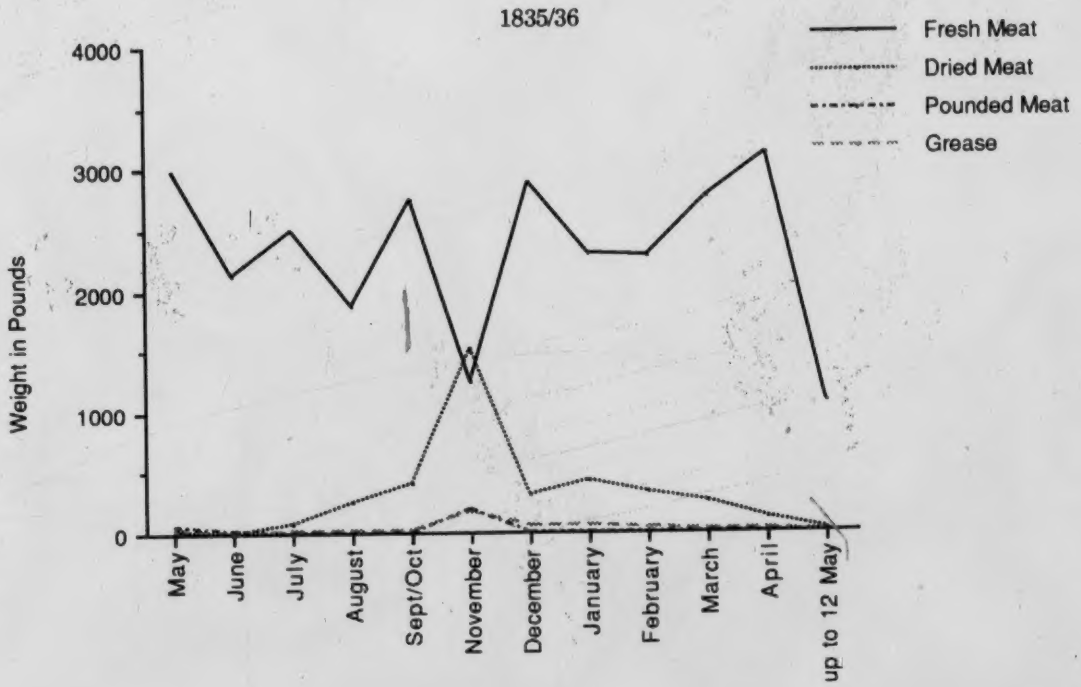


Figure 3.17 Fort Dunvegan meat consumption in 1835/36 on a monthly basis

kill animals or retrieve any animals left in caches, and that the population at the Fort had to subsist on previously stored dried provisions within the Fort.

The second point of similarity is during the month of September where there was a peak in the amount of fresh meat consumed at Fort Dunvegan. This is not too surprising, because this was a period when animals were numerous and fat, and they would have been actively pursued by the Fort Hunters at this time. The month of April was also a period when there was a peak in consumption of fresh meat. This could be due to several reasons. Fresh meat may have been consumed at this time because the weather was becoming warmer. Meat stored in the ice-house would have begun to spoil as temperatures increased, and consumption of this meat may have increased to consume these supplies. On the other hand, the consumption of fresh meat may have been due to the increased numbers of animals available after the winter. It is interesting to note that the sharp decrease of fresh meat consumption in November coincides with an increase of dried meat consumption in both graphs. The lean months start in June and continue until November after which more fresh meat was consumed. In both years April was the peak month with regards to consumption of fresh meat.

It is obvious from the results that large amounts of provisions coming into Fort Dunvegan were in a preserved and processed form, with no bones left in the meat. On the basis of Table 3.3 it was not feasible to quantify specific amounts which were traded through coincidental trade; however, it was still possible to determine that the majority of coincidental trade was in the form of dried provisions. In particular, very large amounts of dried provisions were traded by the natives, whereas the Fort Hunters supplied primarily fresh meat.

It was also possible on the basis of the account books to see which groups of people were consuming fresh meat (in terms of meat weights) as opposed to the consumption of the dried provisions. This consumption could also be seen on a month by month basis for two separate years. These data gave an excellent view into the subsistence strategies and patterns which took place at Fort Dunvegan.

Hypothesis Three

Although the authors of the Fort Dunvegan journals often did not specify which specific species of animals were brought to the Fort, it was possible to determine the primary subsistence base in terms of animal species. As discussed in Hypothesis One, Figures 3.1 to 3.10 represent animal species brought to Fort Dunvegan through contract and coincidental trade. The great variety and diversity of mammals, birds, and fish which were consumed can be provided through the Dunvegan journals, and it was possible to establish a ranking list of species in terms of their dietary importance. This ranking will then be compared to the results of the archaeological faunal analysis of Dunvegan, which will be provided in Chapter Four.

The determination of species importance was made by totalling each species' MNI. This was done first for Contract and Coincidental trade and also by combining the two totals (Table 3.4). The numbers were obtained from the data provided in Figures 3.1 to 3.10.

Twenty-four species of animals, birds and fishes were mentioned in the journals. The MNI of these animals was 2056. The Fort Hunters provided 1496 (72.8 %) animals, while coincidental trade accounted for 560 (27.2 %) animals.

On the basis of the historic documents, it appears that moose (MNI=231) was the primary large mammal utilized for subsistence. Next in rank to this was the bear (MNI=50), then the wapiti with an MNI of 23. Others species of large mammals had relatively low MNI counts.

Species totals for medium and small mamals were quite high. It should be noted again that most medium and small mammals were provided to Fort Dunvegan through

TABLE 3.4: Total Minimum Number of Individuals (MNI) of mammals, birds, and fish from Fort Dunvegan's historic documents

Species	Contract Hunting	Coincidental Trade	Totals
Moose	201	30	231
Red deer	11	12	23
Bear	15	35	50
Bull	1	0	1
Cabri	4	1	5
Deer	3	1	4
Roe buck	0	1	1
Grizzly bear	0	1	1
Antelope	5	0	5
Manishush	2	2	4
Cow	0	4	4
Bullock	0	1	1
'Animal'	139	3	142
Lg animal	4	0	4
Sm animal	6	0	6
Ox	0	1	1
Beaver	32	33	65
Wolverine	1	8	9
Wolf	0	31	31
Fisher	0	3	3
Fox	0	47	47
Marten	0	12	12
Hare	0	187	187
Lynx	0	4	4
Dog	0	2	2
Wildfowl	122	141	263
Fish	950	0	950
TOTALS	1496	560	2056

Coincidental trade, as opposed to that provided by the Fort Hunters. The hare was the most numerous small mammal, with an MNI of 187. Beaver had an MNI of 65, fox 47,and the wolf 31. Other medium and small mammals had much lower MNIs. Finally, the MNI of 'Animal' was 142. As stated previously, authors of many of the journals often did not indicate specific taxa. This total could therefore include a mixture of small, medium and large mammals.

The numbers of wildfowl consumed at Fort Dunvegan were surprisingly high with an MNI of 263. This figure suggests that wildfowl played an important part in the diet at Dunvegan in terms of providing a dietary variety. This is also true of fish (MNI of 950). It is unclear as to exactly how much of the Fort's human population actually consumed fish, since it was also used as dog food.

On occassion, domestic animals were killed to feed the dogs. One instance of this activity was recorded in 1840, and another in 1854, in which horses were killed to be fed specifically to the dogs. The horse bones would have eventually become part of the Fort's refuse, although they likely would have been severely reduced to fragments by the dogs, thus affecting their survivability in the archaeological record.

ECONOMIC ZONATION AND FORAGING STRATEGIES DISCUSSION

Clarification of subsistence strategies which may have been used at Fort Dunvegan can be done by applying Binford's (1983c) model of economic zonation. Viewing his model in terms of Dunvegan, we can consider the Fort as a residential base camp, which is the hub of the zone. Next is what he termed as the "play radius" or "campground" for visitors. While the Fort may not have been a play radius for children, it certainly had an area close to the Fort where Natives camped while conducting trade within the Fort's walls. For example, the following excerpt indicates that after trading the

Natives did not leave the area right away: "...the natives drank all night and traded about 40 moos [sic] skins" (Dunvegan journal, 27 April 1823, HBA B.56/a/1).

Beyond the play radius is the foraging radius, which Binford described as an area searched by individuals from the camp and who return home the same day. Sites located in this region are termed "locations". The foraging radius around Fort Dunvegan may represent short-term trips to do some minimal hunting (e.g., trapping small mammals), or to perform activities such as berry collecting. In Dunvegan's journal for 1853 to 1855, it is evident that the Factor, Henry Maxwell, conducted some hunting of small mammals close to the Fort:

> Nov. 14: Caught 3 Rabbits yesterday and 2 today - Total 5 Rabbits
> Nov. 16: Got out my few snares, 1 Rabbit. Killed 1 partridge
> Nov. 26: Yesterday missed a Large Wolf in One of my Guntraps ...
> Snared 2 Rabbits yesterday and shot 2 grouse today (PMAA 74.1/123)

The foraging radius can also be exploited by work parties who are sent out to perform specific duties, including collecting wood or fishing nearby. The stipulation is that the radius is limited in size; people must be able to go and return within the same day.

The logistical radius is much larger, and as a result work parties may remain away from the residential camp for extended periods of time. A point worth reiterating is that while these work parties are away they must have "maintenance accommodation" such as food and shelter. Examples from Fort Dunvegan are similar to those of Binford's, in which he discussed four types of camps: hunting, fishing, transient, and trapping. Fort Dunvegan has at least three of these types of camps.

The first type of camp within the logistical radius is the hunter's camp. As stated previously, Fort Dunvegan and other fur trade posts relied on their Fort Hunters for provisions. Fort Dunvegan's journals are full of references of the "Hunters", and, in particular, how much meat they brought into the Fort.

> 10 Oct., 1824: Jack Green, an Iroquois arrived from the Hunters above
> with the meat of four Moose Deer, and says he left five more in

security in the woods.

26 Oct. 1824: Wm McGillivray ... brought down the fresh meat of four Moose Deer from the Hunters Tents and employed three of the Indians of St. Johns and Fort Hunters for the Winter. (HBA B.56/a/2)

The location of the Hunter's Tents can be quite variable because they may move if they can not find any animals nearby to kill.

23 July 1806: D. Holmes returned from the hunters they have killed nothing and are gone farther up the River.(Selkirk Papers)

22 Oct. 1824: sent two of our Hunters down the River a hunting. (HBA B.56/a/2)

In addition, the number of Hunter's Camps at any one time can be variable and indeed numerous. References include hunters' camps "above", "below", and "across the River" in relation to the Fort itself. This gives the impression of spokes of a wheel extending out from the hub across the landscape.

There are some references to fish being brought to Fort Dunvegan, and journals from other forts mention fishing more often, which may suggest the importance of fish in their diet. In the 1863-64 Dunvegan Account Book there is a list of men employed there, and their wages. Out of the ten men, one, named J. Bte. L.Amoureux, was employed as a fisherman (see Appendix A: HBA B.56/d/11). Also, there are references to large numbers of fish being taken at the post at Lesser Slave Lake; for example, approximately 25,000 Whitefish were taken in for the winter of 1821 (Baergen 1967:117). Fish also played an important role at Fort Chipewyan (Parker 1967:47).

Other types of field camps may also have been in existence, such as trapping camps. Additionally, caches, another type of site, were frequently mentioned in the Fort Dunvegan journals.

29 March 1823: all the principal men picked out to go for the remaining Caches with a view of collecting a spring Stock [men return several days later]. (HBA B.56/a/1)

2 Dec. 1824: ..sent 2 men ... also for the meat of 2 Moose Deer that were put in security some time ago by Bisson. (HBA B.56/a/2)

Caches were located throughout the logistical radius, and would most often be associated with the movements of the Hunters and their camps. Other types of sites within this region include temporary campsites, which served as a base for a variety of activities. Activities included, but were not limited, to work parties collecting bark, gum ("wattap"), and berries.

It can thus be seen that the logistical radius would have contained a wide variety of site types, all related to the functioning of Fort Dunvegan. Beyond the logistical zone is what Binford termed the extended range or zone. This is an area which is monitored by the people, but may be utilized only periodically (except by the other Natives inhabiting the regions).

It is believed that the Natives' camps were located throughout the various zones as stipulated by Binford, and that they could have been travelling long distances to come to the Fort. Indeed, Fort Dunvegan may have been incorporated into the seasonal round of the Natives. Harmon (1957:213) stated that "the Indians are good walkers; and will at sometimes travel forty miles in a day". These Natives could have extended the limits of the search radii of the Fort; that is, the extended zone could have been extremely large, and food and furs could have been obtained from these distances. The Peace River would have provided an important means of transportation. Dawson stated that the wilderness was first reached through natural areas which provided the easiest access:

> The early explorers as well as the first settlers pierce the wilderness along the natural water highways, through valleys and across the more open plains. Mountains, marshlands, and unbroken forests are the most insuperable barriers at the outset. Their conquest comes later. (Dawson 1934:3)

Hunters could walk upstream along the Peace, hunt, and then raft down the river with the meat. Using boats and/or canoes to go up and downstream could increase the foraging range. Also, in winter, the frozen river would have provided an open highway for tobaggans and snowshoes. These also could have increased substantially the effective foraging range of the Fort Hunters, and the Natives of the region. The use of caches could also have helped (Goddard 1916:212). These factors could have alleviated the risk of hunting out the local areas of large and small game, as well as providing valuable aid to the residents of the Fort. Indeed, it is suggested that to overcome the inconsistency between the static settlement in an environment with variable resources, the Fort's inhabitants must have adapted by extending their foraging range more widely, particularly by hiring Natives and encouraging other Natives to bring in provisions.

Food Distribution and The Subsistence Stream

In this analysis of subsistence strategies it is essential to determine all aspects of the cultural activities that may have taken place at the Fort. While previous portions of this chapter have covered the topic of food coming into the Fort, it is now necessary to discuss the inflow and outflow of the food in relation to the Fort's occupants.

Fort Dunvegan acting as the 'hub', would have been the centre of provisioning activities. The Fort would have been a type of catch basin, receiving food from a variety of sites surrounding the Fort and from a wide range of distances. Different types of food would have come in from the different types of sites (i.e., Hunter's camp; fish camp; cache), and also in different forms (i.e., fresh meat; dried meat).

While it is known that food came into Fort Dunvegan, there was also a flow of food going out of the Fort as well. The latter is not as well understood by other researchers. Thistle (1986), though, considered the flow of food at Cumberland House to be a reciprocal one between the Natives and the House. He stated that the Western Woods Cree utilized Cumberland House "...as a redistribution centre, where they could in effect 'bank' food for later use" (Thistle 1986:57). In the Cumberland House journals there were numerous instances of Indians bringing in meat to trade (i.e., coincidental trade). On the other hand, during difficult times food "...was regularly dispensed to the Indians at

Cumberland House ...thus continuing the pattern of reciprocal exchange"(Thistle 1986:75). Thistle stated that this relationship was not one of dependence on the Europeans, or as parasitism, but rather as "...a basic social concomitant of the economic relationship" (1986:75). Thus a fort, such as Fort Dunvegan, could be seen as a redistribution centre, with some food being given to the natives in times of need.

There are other sources to which Fort Dunvegan would have redistributed food. For instance, in Figures 3.11 to 3.15, it can be seen that once food was received, it was provided not only to the primary occupants of the Fort, but also to Natives, to visitors, to dogs, and given as provisions for voyages.

The Account Books from Fort Dunvegan gave an excellent view on the flow of food into and out of the Fort. For instance, meat could come into Fort Dunvegan fresh, but then be dried or smoked so that it would preserve longer. A reference from the 1864-65 Account Book indicates that this activity did occur, when the Fort paid an old woman with such items as blankets, beads, knives, and tobacco for guarding meat scaffolds (HBA B.56/d/12). This would indicate that meat was being dried at the site of Fort Dunvegan. It is possible that this meat may have then left the Fort to be used as provisions for a voyage or trip. This flow of food is significant because it can affect what was eventually deposited in the form of refuse. The refuse may not reflect all the food that was consumed at the Fort. The actual subsistence patterns include food also leaving the site.

Another route that food followed was when Fort Dunvegan provided New Caledonia with leather and pack cords, among others things. For example, in 1828 and 1829, when Fort Dunvegan provided moose skins,parchment, pack cords, babiche and sinews, the Fort also provided a total of 108 bags of pemmican, and 1190 pounds of dried meat (PMAA 74.1). In the Account Book for 1832-33, the Fort supplied New Caledonia with pemmican, dried meat, and grease (see Table 3.5; Appendix A). It also supplied food and skins to other forts of the region. Tables 3.5 to 3.12, covering a number of years between

1832-33 and 1864-65, provide examples of this occurring. It appears that it was quite common for the forts of the region to request specific items, including food. Thus there was a transfer of food, and therefore not all food coming into Fort Dunvegan remained there. It may have been consumed locally, or redistributed to other forts, or given as provisions for voyages.

SUMMARY

Historic documents were utilized in this chapter for an analysis of subsistence practices at Fort Dunvegan. The topic of the validity of historic documents was raised, and it was determined that the reliability of some observations should at times be questioned. This is due to the fact that the records are primarily business-oriented and provide only a selective view of the Natives. However, because the interest here concerns subsistence activities, it is felt that the journals can be reliable sources of data for these purposes. On the other hand, the variability of the journals between authors, and certain amounts of vagueness in them, did cause some confusion.

Three hypotheses were established on the basis of Fort Dunvegan's historic documents, and were discussed in detail above. Two forms of trade, Contract and Coincidental, were defined. Contract trade was arranged with hired Fort Hunters for food, and it was a formal agreement. On the other hand, Coincidental trade was a random trade of both fresh food and dried provisions by other Natives. Although this food source was not dependable, it was a significant source of dried meat, pounded meat, and grease.

Hypothesis One discussed Contract and Coincidental trade and how they could be identified in the faunal record at Fort Dunvegan. It was found that the Fort Hunters brought to Fort Dunvegan mostly large mammals, and occasionally wildfowl and fish, but all other mammals, particularly medium and small mammals, were traded through Coincidental trade.

Hypothesis Two discussed the amounts of food which came into Fort Dunvegan in a preserved boneless form which would not have left any archaeological correlates. Most fresh meat was obtained from the Fort Hunters, but while some fresh meat was obtained through Coincidental trade the majority was dried provisions. In fact, the majority of dried provisions were obtained by Coincidental trade. In terms of consumption of this food, the people of the Fort consumed primarily fresh meat, and some dried and pounded meat, and grease. However, for the voyages the trend reversed and a great deal of dried meat was consumed but little fresh meat.

Hypothesis Three covered what animal species were recovered through Contract and Coincidental trade, and their relative rank in terms of dietary importance. Among the large mammals, the moose was the most numerous. Other large mammals included bear and red deer. For smaller mammals, the hare had the highest MNI, followed by the beaver, fox, and wolf.

The data from the historic records were applied to Binford's model of economic zonation and foraging stategies. Fort Dunvegan formed part of a network exploiting different sectors of its catchment area with specific types of sites. These included hunting camps, fish camps, caches, and sites for berry picking. Different types of food would have come from these different sites, and in a variety of forms. Overall, this gives an impression of the Fort as being at the hub of activity, with spokes of a wheel extending out across the landscape to the different sites. While there was constantly food coming into Fort Dunvegan, there were also amounts of food leaving the Fort, making it a type of redistibution centre. If this was the case, these cultural activities and hence cultural formation processes would have complicated the archaeological record. Not all food brought to the site was consumed there, and this would determine what would have been deposited as refuse on the site. Therefore archaeological interpretations could be very difficult in terms of properly establishing what past dietary practices there were, including subsistence activities and patterns.

Overall the hypotheses have helped to elucidate cultural formation processes of the archaeological assemblage at Fort Dunvegan. The manner in which the faunal remains were treated in systemic context holds implications as to how they will appear in the archaeological context. The general system of dynamics within the cultural system has resulted in specific patterns of faunal remains. For instance, the employment of Fort Hunters has resulted in specific patterns of butchering and hence animal remains should reflect this. Therefore the journals have helped to clarify past subsistence practices at Fort Dunvegan.

CHAPTER FOUR

ANALYSIS AND INTERPRETATION OF ZOOARCHAEOLOGICAL REMAINS RECOVERED FROM FORT DUNVEGAN

INTRODUCTION

Archaeological fieldwork was conducted at Fort Dunvegan on two separate occasions: during the summer of 1982, and in 1987 when a surface collection was made and matrix samples were collected. A faunal assemblage was recovered in each of these instances, and the data are presented in two parts. The first part is a discussion of the 1982 excavations, and the second part covers the 1987 surface collection as well as material recovered from matrix samples. In addition to a discussion of the faunal assemblage , data will be presented concerning the architectural structures found during the 1982 excavations. These help to determine to what extent the site has been post-occupationally disturbed.

ARCHAEOLOGICAL INVESTIGATIONS IN 1982

As mentioned previously, Fort Dunvegan was moved in 1878 to a new location approximately 100 meters to the east of the original site. All fieldwork discussed presently involves only the original Fort Dunvegan, although other excavations at the later site have taken place. Archaeological fieldwork was conducted at the early site of Fort Dunvegan (designated as site GlQp-3 by the Borden [1952] system) in the summer of 1982 by Heinz Pyszczyk, of the former Archaeological Survey of Alberta, Edmonton (now the Archaeology Section, Provincial Museum). The primary objective of this work was to determine the exact location of the Fort. It was thought that "...the concentration of a diverse number of historic themes makes Dunvegan an ideal setting for a historic public interpretive centre..." (Pyszczyk 1982:1). Location of the Fort structure was therefore necessary to assess the preservation of architectural and artifactual remains. This evaluation was particularly important because it was not known to what extent post-occupational disturbance had affected the site.

Fieldwork Methods

An arbitrary grid system consisting of a number of different-sized units was placed over the site after first establishing a site datum (Figure 4.1). Forty-one long, narrow excavation units were placed subjectively within the 100 square meter area of concern to attempt "to define maximum fort boundaries first, then [to] sample the historical features within those boundaries" (Pyszczyk 1982:27). Examples of these units can be found in Plates 4.1 to 4.4. It is important to note that this approach meant that the "artifact and faunal samples were entirely dependent on where units were placed to find structural features" (Pyszczyk 1982:27) and that there was no attempt to obtain a representative artifact and faunal sample.

The number that each unit was assigned was based on the order in which the units were excavated, and each vertical level was designated alphabetically. Excavation procedures were as follows:

> All disturbed plowed matrix was quickly shovel-shaved, and all undisturbed features were exposed and cleaned by trowel. Matrix was either totally screened or sample screened to recover artifact and faunal materials... (Pyszczyk 1982:28)

Table 4.1 indicates which units were sample screened. Matrix was screened using a one-quarter inch (6.33 mm) mesh. Two units were not screened at all; 16 units had only 50% of their matrix screened; and all others were 100% screened.

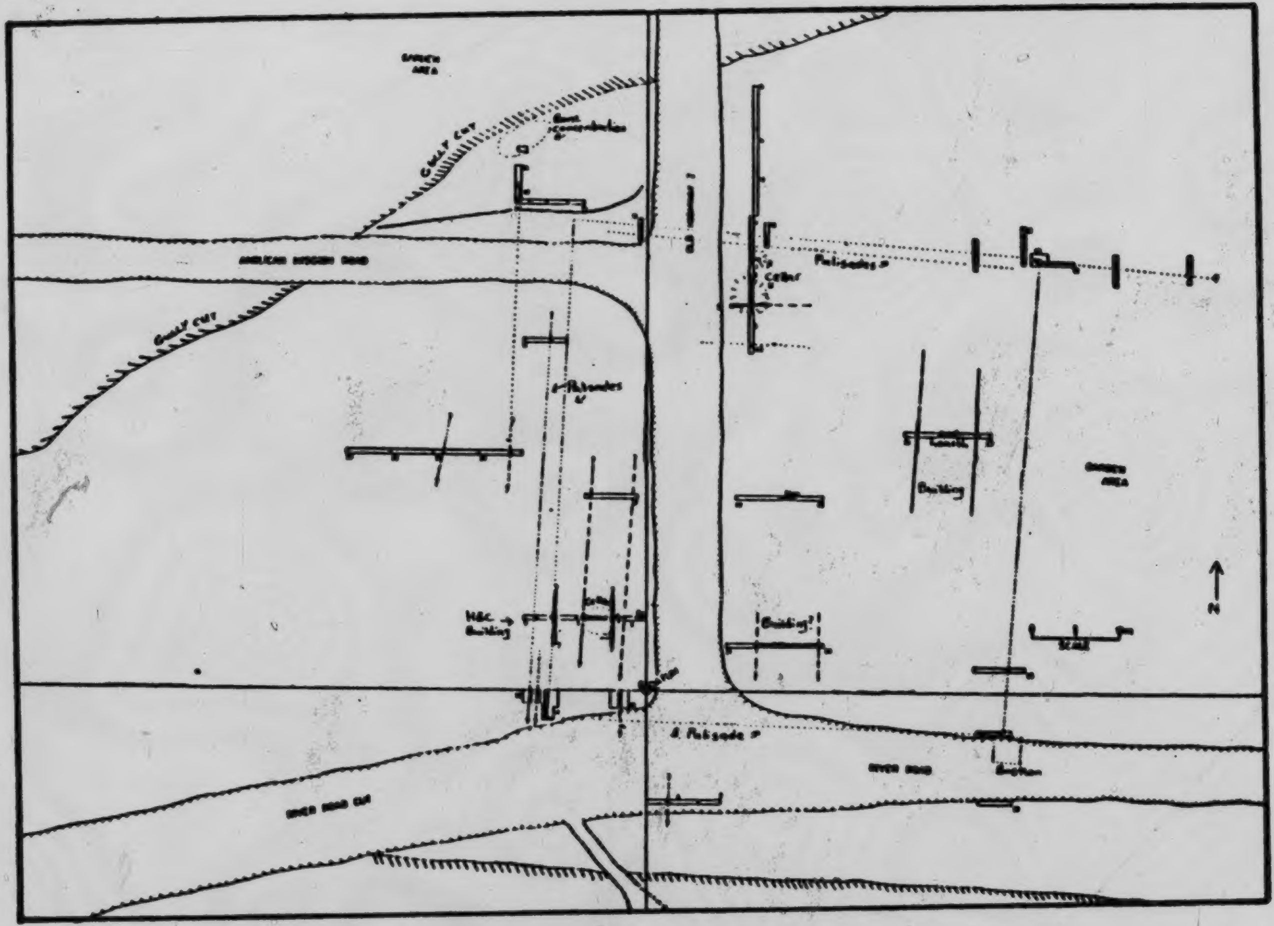

GARDEN AREA
GULLY CUT
AMERICAN MISSION ROAD
GULLY CUT
Palisades
Cellar
Palisades
Building
GARDEN AREA
N
HBC Building
Building?
Scale
S. Palisade
RIVER ROAD
Bastion
RIVER ROAD CUT

Figure 4.1 Location of excavation units at Fort Dunvegan, 1982.
(modified from 1983:208)

Plate 4.1 Example of unit excavated in 1982, Fort Dunvegan (Photo: ASA)

Unit 28
Level B

Plate 4.2 Example of unit excavated in 1982, Fort Dunvegan (Photo: ASA)

Unit 5
Level C

Plate 4.3 Example of narrow unit excavated in 1982, Fort Dunvegan (Photo: ASA)

Unit 10
N Wall

Plate 4.4 Example of narrow unit excavated in 1982, Fort Dunvegan (Photo: ASA)

TABLE 4.1 The percentage of matrix screened per excavation unit

UNIT	LEVELS	% SCREENED	UNIT	LEVELS	% SCREENED
1	A,B	100	21	all	50
2	A,B	100	22	A,B	100
3	A	road	23	A,B	100
3	B	100	24	A,B	100
4	A	road	25	all	0
4	B,C	100	26	all	50
5	A,B,C	100	27	all	50
6	all	50	28	all	100
7	A	50	29	all	100
8	A	50	30	all	100
9	all	50	31	all	100
10	all	50	32	all	100
11	A,B	100	33	all	50
12	all	0	34	all	50
13	A,B	100	35	all	100
14	all	50	36	all	100
15	all	50	37	all	100
16	all	50	38	all	50
17	all	50	39	all	100
18	all	50	40	all	100
19	all	100	41	all	100
20	A,B	100			

(after Pyszczyk 1982:159)

Discussion of the type and of the amount of disturbance that has taken place at the site is necessary because disturbance activites will invariably affect the structural remains and especially the artifact distribution over the site. Pyszczyk (1982) isolated three main factors that have disturbed the area encompassing Fort Dunvegan's boundaries. These include agricultural activities, in the form of cultivation (for market garden produce); road construction; and natural processes. Excavations in 1982 were aimed at determining the extent to which the site had been affected by these activities.

Pyszczyk estimated that 60 years of agriculture have disturbed "between 25 and 30 centimeters of the upper soil profile ... over almost the entire site" (1982:23). However, the presence of a large amount of overburden may have helped to prevent certain features from being destroyed. This overburden "could have accumulated from constant plowing mixing the upper portions of collapsed historic materials and rubble" (1982:23). While architectural features may have been protected from total destruction, disturbance to the distribution of artifact and faunal remains may have been more serious. In spite of this, Pyszczyk stated that:

> ...although agricultural activities have moved artifacts and faunal remains from their original places of deposition, this movement was likely minimal and the spatial provenience of these materials is still useful for various levels of analyses. (1982:23)

Road construction in the area has also disturbed the site. Comparison of the area with historic plan maps of the Fort indicates that the construction of the Anglican Mission Road and the old Highway #2 possibly cut through some areas of the Fort (see Figure 4.2). Indeed, some features may have been destroyed due to this construction.

A third factor noted by Pyszczyk concerns natural forces acting on the site. A gully some 20 meters wide and four meters deep has formed to the west of the site (Pyszczyk 1982:26). As far as is known this gully erosion has not affected the Fort remains, but Pyszczyk has pointed out that any historical features outside of the Fort compound along the west edge may have been eroded away. (1982:26).

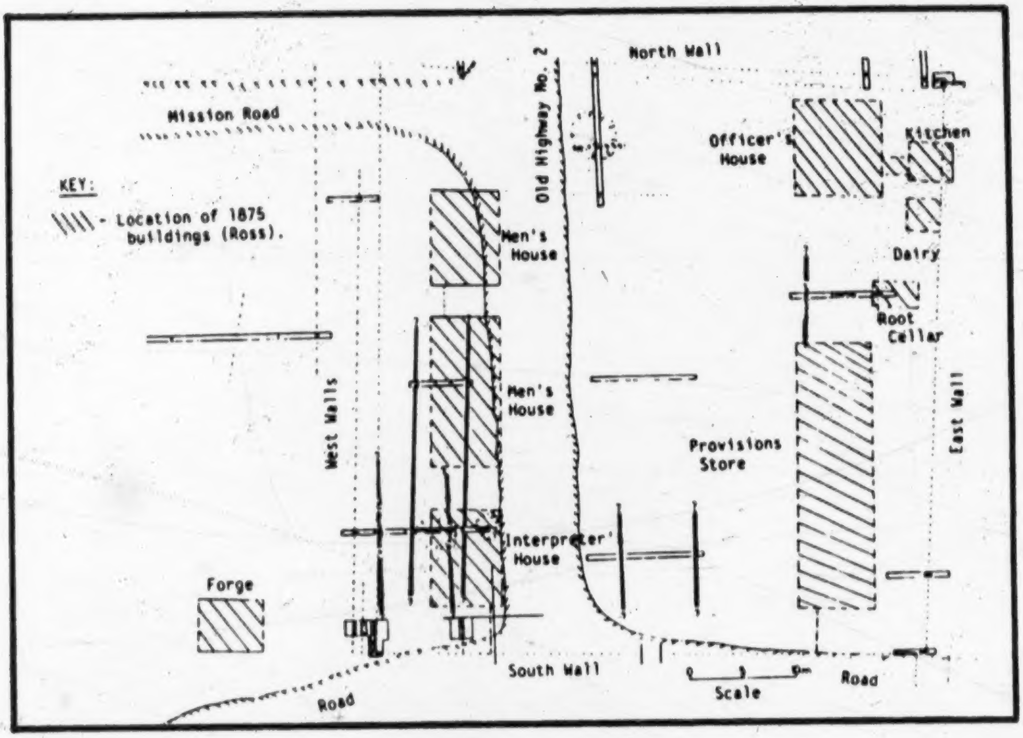

North Wall
Mission Road
Old Highway No. 2
KEY:
- Location of 1875 buildings (Ross).
Officer's House
Kitchen
Men's House
Dairy
Root Cellar
Men's House
West Walls
Provisions Store
East Wall
Interpreter' House
Forge
South Wall
Scale
Road
Road

Figure 4.2 Comparison of recent disturbance and of available historic map of the early Fort Dunvegan site. (from Pyszczyk 1983:25)

Laboratory Work

I catalogued and analysed the 1982 faunal assemblage in 1987. The assemblage had been previously cleaned and roughly sorted into identifiable and unidentifiable bone fragments. All fragments were further identified to as finite a zoological classification as possible. Identification of the assemblage was made possible using the comparative faunal collection at the former Archaeological Survey of Alberta, Edmonton (now the Archaeology Section, Provincial Museum of Alberta). Faunal remains listed per element and species can be found in Appendix B.

Bone fragments that were unidentifiable were sorted into the following categories: (1) large mammal bone; (2) mammal bone; (3) bird bone, (4) bird or rabbit bone. Bones with cut or butcher marks and burnt and/or calcined bone were also noted. All bone was weighed in grams and quantified.

Those fragments that were identifiable were further sorted by class in the laboratory into four groups, namely (1) mammals; (2) birds; (3) fish; and (4) shells. For each class, except for the shells, the name of the element was noted along with (wherever possible) the part of the element (i.e., proximal, distal). The side of the body from which the element came was noted as well as its state of fusion. If the epiphysis was fused (or fusing to the diaphysis), the element was described as adult; if it was unfused the element was described as immature. Any indication of cultural or natural modification, such as butchering marks or evidence of burning, was also noted. Finally, each element was weighed in grams.

Bones were quantified using two methods. The first was the number of identified specimens (NISP) which is a count of each of the identified bone fragments. The second method was the minimum number of individuals (MNI) where left and right elements of each species were separated and the larger number taken as the MNI. Both NISP and MNI have their limitations (Klein and Cruz-Uribe 1984:26), but taken together they can be useful in many analyses.

Results of Faunal Analysis

A total of 15,756 bones were recovered during the 1982 excavations. Table 4.2 illustrates the proportions represented in the four classes:

TABLE 4.2 Proportions of classes from 1982 excavations

CLASS	NISP	%
Shell	6	0.04
Fish	9	0.06
Bird	352	2.23
Mammal	15,387	97.65
Indeterminate	2	0.01
TOTAL	15,756	99.99

Two bone fragments were indeterminate to the class level. All taxa are summarized according to NISP and MNI in Table 4.3.

Twenty-nine taxa were identified from the faunal remains, with a total of 421 identifiable bone fragments. The 389 mammal bone fragments comprise 92.4% of the total number of identified fragments. A much smaller percentage of the bones were bird (N= 31; 7.4%). Only one fish fragment, a scale, was identified, accounting for 0.2% of the identifiable portion of the assemblage. Some elements could be identified to the genus level only because of their fragmentary nature and because of the degree of difficulty of distinguishing these particular species. Among the mammals these included *Canis* (sp)., in which the element could represent dog/coyote/wolf; *Ursus* (sp)., which could be either black bear or grizzly; and *Bison* or *Bos* (sp.), where some elements could be either *Bison bison* or domesticated cow,*Bos taurus*.

Mammals

Eighteen taxa of mammals were identified in the recovered faunal remains at Fort Dunvegan (totalling 5848.5 grams). These can be roughly sorted into three groups; large (N=10), medium (N=4) and small-sized mammals (N=4).

TABLE 4.3: Faunal remains recovered from excavations in 1982, including MNI and fragment count (NISP)

MAMMALS	NISP	% NISP of ident. bone	MNI
Snowshoe hare *Lepus americanus*	100	23.4	9
Northern flying squirrel *Glaucomys sabrinus*	1	0.2	1
Beaver *Castor canadensis*	97	22.7	4
Muskrat *Ondatra zibethicus*	1	0.2	1
Vole *Microtus* sp.	12	2.8	2
Dog/coyote/wolf *Canis* sp.	12	2.8	1
Red fox *Vulpes vulpes*	24	5.6	1
Black bear *Ursus americanus*	15	3.5	1
Bear *Ursus* sp.	7	1.6	1
Marten *Martes americana*	3	0.7	1
Wolverine *Gulo gulo*	8	1.9	1
Lynx *Lynx lynx*	18	4.2	1
Mule deer *Odocoileus hemionus*	5	1.2	1
Deer *Odocoileus* sp.	1	0.2	1
Moose *Alces alces*	57	13.3	3
Wapiti *Cervus elaphus*	15	3.5	2
Bison *Bison bison*	5	1.2	1
Cow *Bos taurus*	2	0.5	1
Bison or cow *Bison* or *Bos* sp.	2	0.5	1
Horse *Equus caballus*	4	0.9	1
TOTAL IDENTIFIED MAMMALS:	389		
UNIDENTIFIED MAMMALS:			
Small	17		
Medium to small	18		
medium	23		
medium to large	556		
large	1135		
mammal	13,249		
TOTAL MAMMAL:	15,387		

BIRDS

IDENTIFIED BIRDS

Canada goose *Branta canadensis*	2	0.5	1
Mallard *Anas platyrhynchos*	2	0.5	1
Northern shoveler *Anas clypeata*	1	0.2	1
American Widgeon *Anas americana*	1	0.2	1
Surface-feeding ducks *Anas* sp.	16	3.7	4
Northern harrier *Circus cyaneus*	1	0.2	1
Sharp-tailed grouse *Tympanuchus phasianellus*	2	0.5	1
Grouse *Tetraoninae* sp.	5	1.2	1
Crane *Grus* sp.	1	0.2	1

TABLE 4.3 (Con't)

BIRDS	NISP	% NISP of ident. bone	MNI
TOTAL IDENTIFIED BIRD:	31		
UNIDENTIFIED BIRD:	42		
TOTAL BIRD:	73		
UNIDENTIFIED BIRD/HARE	279		
TOTAL:	352		
FISH			
IDENTIFIED FISH			
Lake whitefish *Coregonus clupeaformis*	1	0.2	1
TOTAL IDENTIFIED FISH:	1		
UNIDENTIFIED FISH:	8		
TOTAL FISH	9		
MOLLUSCS			
Freshwater clam shell family *Unionidae*	6	1.4	
TOTAL MOLLUSC:	6		
INDETERMINATE BONE:	2		
TOTAL FAUNAL REMAINS:	15,756	99.7	

Of the large mammals, which consisted of 29.0% of the total number of identified fragments, the moose (*Alces alces*) was the most numerous in relation to bone fragments, but it had a low MNI of only three individuals. Wapiti (*Cervus elaphus*) was the next most numerous large mammal, with an NISP of 15, but an MNI of only two. Of interest is the black bear (*Ursus americanus*) which also was represented by 15 bone fragments, but with an MNI of one. Other large mammals, including bison and mule deer, were also represented at the site but with relatively few fragments.

Two domesticated species of large mammal were identified in the assemblage: the horse (*Equus caballus*) and the cow (*Bos taurus*). The NISP of the horse was four; and two for the cow, although there were two additional specimens that were questionable.

There were bones of four medium-sized mammals found on the site. These include the beaver (*Castor canadensis*), the wolverine (*Gulo gulo*), the lynx (*Lynx canadensis*) and the dog/coyote/wolf (*Canis* sp.). The beaver had the second-highest NISP of all mammals, which was 97 (MNI of four). The lynx had a surprisingly high NISP of 18 and wolverine an NISP of eight. However, if one considers the MNI of these last two species, they represent a minimum of just one individual each. The genus *Canis* sp. had an NISP of 12.

There were also four small-sized mammals represented at the site, the most numerous being the snowshoe hare (*Lepus americanus*). It had a NISP of 100 and MNI of nine. The fox (*Vulpes vulpes*), the muskrat (*Ondatra zibethicus*) and the marten (*Martes americana*) were the other three species recovered. The fox had a NISP of 24, marten three, and muskrat was represented by just one bone fragment from a tibia.

The snowshoe hare was not only the most numerous small mammal, but it was also the most numerous out of all the mammals. It was also significantly more frequent than the other three small mammals.

With reference to unidentifiable mammal bones, there were 14,998 fragments representing 97.8% of the total number of fragments recovered in all classes. These fragments were divided into size differences according to small mammals, medium to small, medium, medium to large, and large mammals, and also just mammal. While large mammal bones represented only 7.4% of the total number of bone fragments, there was a majority of bones which could be identified only as 'mammal', because of the fragmentary nature of the bones. They represented 86.4% of the total number of bone fragments.

Birds

There were 31 identifiable bird bone fragments, in which nine taxa were identified. This represents only 7.4% of the total number of identified faunal remains recovered at Fort Dunvegan. Forty-two bone fragments were identified as being bird, but due to their fragmentary nature they could not be identified to genus or species. In addition, 279 bone fragments were identified as being either bird or rabbit/hare bones. These fragments, primarily longbone pieces, are very similar in that both are hollow and thin-walled. It is extremely difficult to differentiate between bird or rabbit longbone fragments, and the small fragments are virtually indistinguishable if no identifiable features are present. There are thus 73 definite bird bones, with a possibility of 352 bird bone fragments although as many as 279 fragments could be either bird or rabbit.

Of the 31 bone fragments which were identified, some were identified to genus level, and some to genus and species level (see Table 4.2). Of the seven species identified, four were aquatic birds and three were land birds.

Among the aquatic bird remains, the following species were identified to species level: the mallard (*Anas platyrhynchos*), the American widgeon (*Anas americana*), the Northern shoveler (*Anas clypeata*), and the Canada goose (*Branta canadensis*). One fragment was identified as belonging to the crane family (Family *Gruidae*,*Grus* sp.), and 16 elements to *Anas* sp. (surface-feeding duck). All of these species are known to occur in the region seasonally and numerous waterbodies are available, including the Peace River and small lakes and marshes nearby.

Land birds which were identified include the grouse identified to genus level only (Subfamily*Tetraoninae*), and one to species level, the sharp-tailed grouse (*Tympanuchus phasianelus*). One other land species was identified, which was a humerus fragment of a Northern Harrier (*Circus cyaneus*). The harrier's habitat includes meadows and marshes (Godfrey 1986:128), and thus would have been within the vicinity of Fort Dunvegan.

The most numerous taxon was *Anas* (sp.), or duck, with a frequency of 16 and an MNI of four. All other species or taxa had low MNI of one. These values likely under-represent the actual numbers of birds utilized for subsistence at the Fort.

Fish

Only one identifiable element of a fish was recovered at Fort Dunvegan. This was a scale from the lake whitefish (*Coregonus clupeaformis*). In addition, eight fish bones were recovered but were unidentifiable to genus or species level. These bones consisted of four vertebrae, two skull fragments, and two unidentified fish bone pieces.

Molluscs

Six clam shell fragments were also found on the site of Fort Dunvegan, but the fragments were too small to speciate. They are freshwater clams belonging to the family *Unionidae.*

FIELDWORK CONDUCTED IN 1987

The aim of the 1987 fieldwork that I conducted was to obtain additional faunal material to improve the understanding of diet and subsistence based on the faunal assemblage. The faunal material recovered in 1982 was obtained using a 1/4 inch screen mesh size. Research has indicated, however, that screen size can influence what size and amount of faunal material can be recovered.

Numerous studies and experiments have been performed to determine what, if any, differences exist in faunal samples recovered from varying screen sizes. Studies have shown (Casteel 1972; Payne 1975) that excavators often miss smaller faunal remains when utilizing a 1/4 inch screen, resulting in a sample so biased as to be possibly misleading to the analyst. In Casteel's (1972) study, 100% of the fish vertebrae were lost through a 1/4 inch mesh (1972:385). Also, tests done by Payne (1975) have shown that a "wide variety of smaller animals went almost totally unsuspected" (1975:14) when samples were sieved through this mesh size. Schiffer (1987) has also found this to be true:

> ...screens of varying mesh size produce differences in recovery rates. Larger mesh sizes (ca. .25-.5 inch) lead to low recovery rates for very small artifacts...and thereby introduce an appreciable size bias into the archaeological record (Schiffer 1987:385)

Research has demonstrated that smaller faunal remains such as fish and bird bones may be under-represented in a faunal assemblage when using a 1/4 inch mesh. I therefore decided to obtain and process matrix samples from Fort Dunvegan to test this possibility.

Fieldwork Methods

In order to fulfill the foregoing aim, a grid was placed over only the western half of the site (see Figure 4.3) and matrix samples were collected along with a surface collection of all faunal material. It was not possible to collect samples on the eastern portion of the site because of agricultural activities (crops were too far advanced), therefore only approximately fifty per cent of the site was sampled in this manner.

The original 1982 datum could not be relocated, likely because it had been removed or buried, so a new datum point was therefore established to the south of the presumed original location. A grid, 40 meters by 50 meters, consisting of 80 five meter by five meter units, was layed out. Not all units were used because of vegetation restrictions (see Figure

4.4). In the summer of 1987 the field in which the work took place was utilized for growing strawberries. This hampered the collection to a degree, but the plants were spaced far apart, and therefore interfered minimally with the surface and matrix collection (see Plates 4.5 to 4.8).

The surface collection involved recovering all visible faunal material from all of the available units (N=73). Matrix was recovered only from the even-numbered units (N=36). For each specified unit, matrix was obtained from within the five meter by five meter unit using a shovel to penetrate to approximately 20 cm below the surface. Table 4.5 lists the total amount of matrix recovered per unit sampled.

Laboratory Work

Faunal material that was recovered from the surface collection was cleaned and identified at the former Archaeological Survey of Alberta. Information on identifiable fragments was recorded according to the categories listed above for the 1982 assemblage. Unidentifiable bone was also classified in the same manner as the 1982 non-identifiable portion.

More detailed work was done with the matrix samples. These samples were wet-sieved using three nested mesh sizes: 6.3 mm (0.250 inches), 3.35 mm (0.132 inches), and 0.85 mm (0.0331 inches), respectively. The material was allowed to air dry, and faunal material was then collected from the samples. The material from the smallest screen was dealt with in a slightly different manner: time constraints dictated that this material had to be sampled; therefore a 20% sample, based on weight, was taken and examined for faunal remains.

Results from Surface Collection

There were 1454 fragments of faunal material recovered during the surface collection. The proportions represented in each of the four classes are illustrated below.

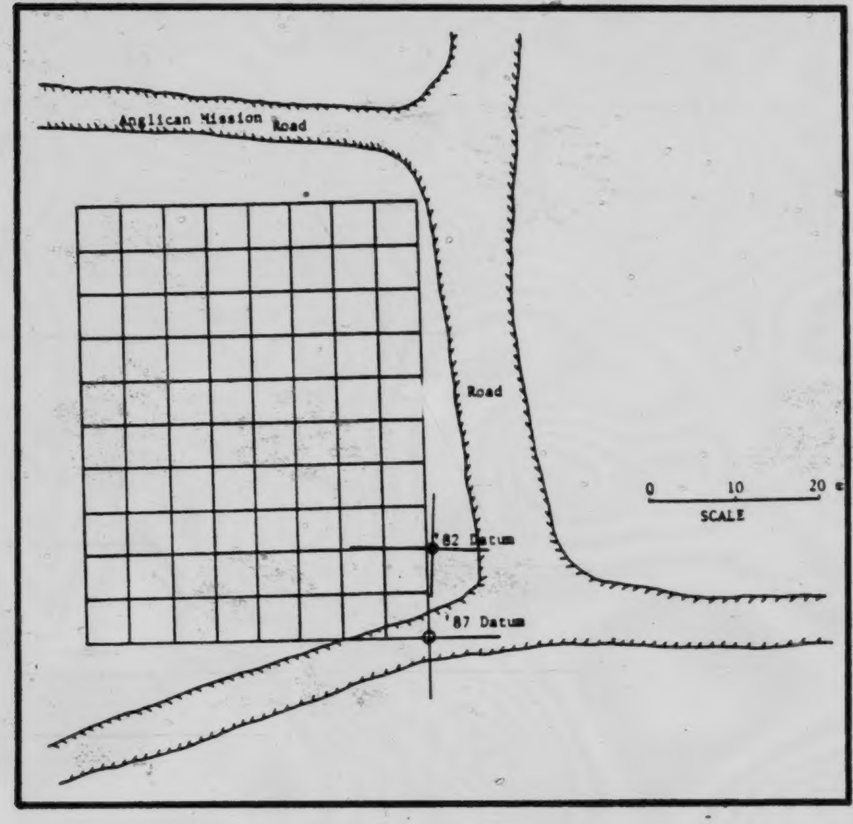

Anglican Mission Road
Road
0
10
20 m
SCALE
'82 Datum
'87 Datum

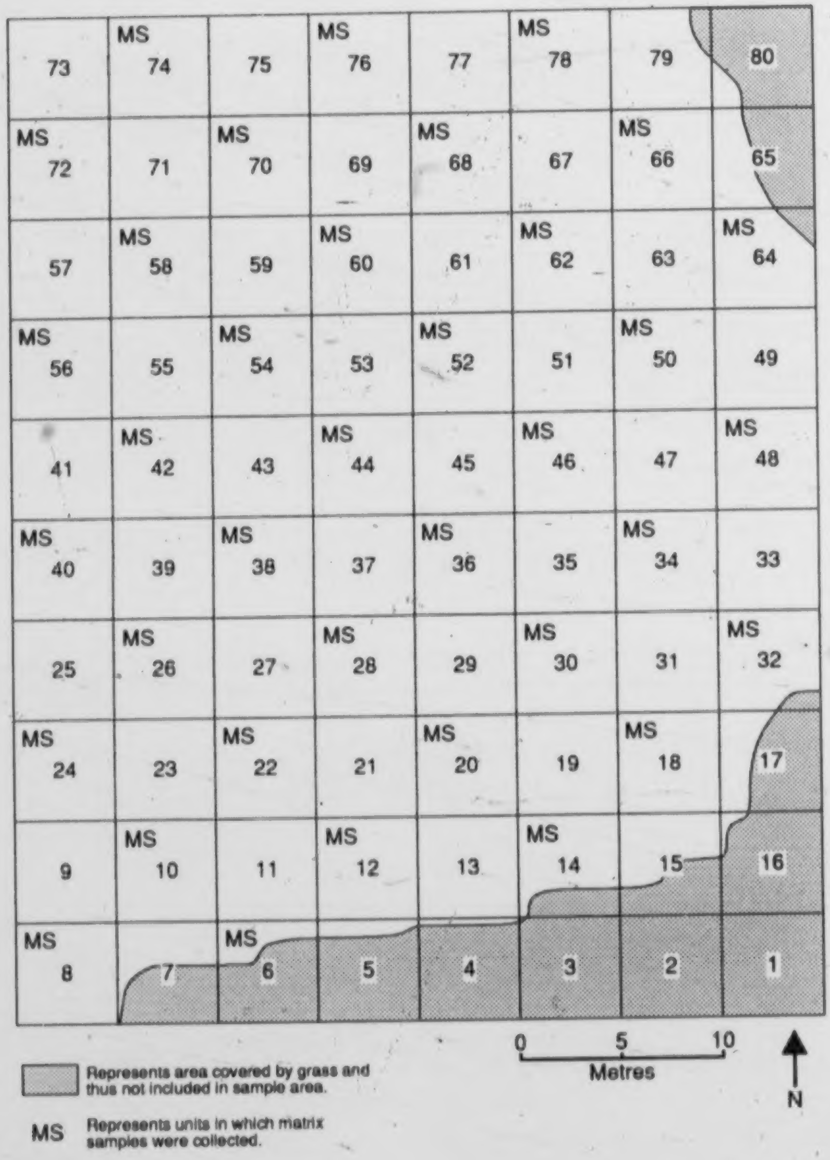
Figure 4.3 Grid set up over portion of site GlQp-3

Plate 4.5 Surface collection in progress, 1987

Plate 4.6 Field where surface collection took place. Note the Peace River on the left.

Plate 4.7 Surface collection in progress, 1987

Plate 4.8 Surface collection and matrix samples in progress, 1987
(Note vegetation pattern)


73
MS 74
75
MS 76
77
MS 78
79
80
MS 72
71
MS 70
69
MS 68
67
MS 66
65
57
MS 58
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MS 60
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MS 62
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MS 64
MS 56
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MS 54
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MS 52
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MS 50
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MS 34
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MS 26
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MS 28
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MS 30
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MS 32
MS 24
23
MS 22
21
MS 20
19
MS 18
17
9
MS 10
11
MS 12
13
MS 14
15
16
MS 8
7
MS 6
5
4
3
2
1
0
5
10
Metres
N
▨ Represents area covered by grass and thus not included in sample area.
MS Represents units in which matrix samples were collected.

FIGURE 4.4 Surface collection and matrix samples, GlQp-3

TABLE 4.4 Proportion of classes from 1987 surface collection

CLASS	NISP	%
Shell	0	0.00
Fish	0	0.00
Bird	14	0.96
Mammal	1440	99.03
TOTAL	1454	99.99

All taxa are summarized in Table 4.4 according to NISP and MNI. Of this material, 108 (7.4%) fragments were identifiable, while 1346 (92.6%) fragments were unidentifiable. This low percentage of identifiable elements is not surprising in view of the fragmentary nature of many of the bones.

Twenty taxa were identified from the 108 bone fragments. One hundred and seven bone fragments (99.1%) were mammal, only one fragment (0.9%) was identified as bird, and no fish bones were recovered. Like the 1982 collection, some bone elements were identified to genus level only because of the lack of identifiable features on the bones.

Mammals

Nineteen taxa of mammals were identified, including ten large, five medium-sized, and four small mammals. Of the large mammals, two species were domestic. These included the horse (*Equus caballus*), in which four elements were identified (MNI=1), and the cow (*Bos taurus*) where two elements were identified (MNI=2). This parallels the results of the 1982 excavation. There were also three bone fragments which could be only identified to either *Bison* species or *Bos* species.

The large mammal represented by the most bone fragments was the moose (*Alces alces*), with an NISP of 49 bones (MNI=7). The bison (*Bison bison*) and the wapiti (*Cervus elaphus*) were each represented by seven bone fragments; the bison's MNI was one and the wapiti's was two. There were five fragments of the black bear (*Ursus americanus*) recovered, but with an MNI of only one. Four elements representing deer were recovered;

TABLE 4.5: Total amount of matrix recovered per unit sampled in 1987

UNIT	AMOUNT OF MATRIX RECOVERED (Volume in Litres)
6	18.0
8	14.0
10	14.5
12	16.6
14	13.4
16	not tested
18	14.0
20	15.7
22	14.4
24	13.9
26	14.4
28	15.4
30	13.2
32	13.9
34	14.2
36	13.8
38	14.0
40	16.0
42	15.0
44	13.1
46	12.0
48	14.8
50	14.4
52	13.0
54	14.2
56	13.8
58	14.0
60	13.5
62	15.3
64	16.0
66	16.0
68	13.3
70	13.6
72	13.5
74	12.9
76	14.3
78	16.0
80	not tested

TABLE 4.6: Faunal remains recovered from a surface collection in 1987, including MNI and fragment count (NISP)

MAMMALS	NISP	% NISP ident. bone	MNI
Snowshoe hare *Lepus americanus*	1	0.9	1
Beaver *Castor canadensis*	13	12.0	2
Coyote *Canis latrans*	1	0.9	1
Dog/coyote/wolf *Canis* sp.	1	0.9	1
Red fox *Vulpes vulpes*	3	2.8	1
Black bear *Ursus americanus*	5	4.6	1
Grizzly bear *Ursus arctos*	1	0.9	1
Marten *Martes americana*	1	0.9	1
Wolverine *Gulo gulo*	3	2.8	1
River otter *Lontra canadensis*	1(?)	0.9	1
Lynx *Lynx lynx*	1	0.9	1
Mule deer *Odocoileus hemionus*	3	2.8	1
Deer sp. *Odocoileus* sp.	1	0.9	1
Moose *Alces alces*	49	45.4	7
Wapiti *Cervus elaphus*	7	6.5	2
Bison *Bison bison*	7	6.5	1
Cow *Bos taurus*	2	1.9	2
Bison or cow *Bison* or *Bos* sp.	3	2.8	3
Horse *Equus caballus*	4	3.7	1
TOTAL IDENTIFIED MAMMALS:	107		
UNIDENTIFIED MAMMALS:			
small	1		
medium to small	4		
medium	16		
large	846		
mammal	466		
TOTAL	1333		
TOTAL MAMMAL:	1440		

(Con't)

TABLE 4.6 (Con't)

BIRDS	NISP	% NISP ident. bone	MNI
IDENTIFIED BIRDS			
Surface-feeding duck *Anas* sp.	1	0.9	1
TOTAL	1		
UNIDENTIFIED BIRD	7		
TOTAL BIRD	8		
UNIDENTIFIED BIRD/HARE	6		
TOTAL	14		
TOTAL FAUNAL REMAINS:	1454	99.9	

three were identified as mule deer (*Odocoileus hemionus*), and one was identifiable to genus level only. The mule deer had an MNI of one.

With reference to medium-sized mammals, four species were identified and one mammal to genus level. The species represented by the most bone fragments was the beaver (*Castor canadensis*), in which 13 fragments (MNI=2) were identified. The two other species were only represented by a few elements of each. There were three elements of the wolverine (*Gulo gulo*) (MNI=1), and the coyote (*Canis latrans*) and the lynx (*Lynx lynx*) were each represented by one element. In addition, one element (a mandible fragment) was identified to genus level only -- the *Canis* species. The bone appears to be either from a wolf or a dog, but it was not possible to determine exact species.

There were four small mammals recovered, but with very low frequencies. The red fox (*Vulpes vulpes*) was represented by three elements (MNI=1), while the other three species were represented by only one element each, and include the marten (*Martes americana*), the hare (*Lepus americanus*), and the river otter (*Lontra canadensis*). This last species is a tentative identification.

There were 1333 mammal bone fragments that were unidentifiable in this assemblage. Of these bones recovered, 846 (62.9) fragments were large mammal, 16 (1.2%) were medium mammal, four (0.3%) were medium to small mammal, and one (0.1%) was small mammal. A total of 466 (34.6%) were identified only as mammal.

Birds

Eight bones recovered during the 1987 surface collection were identified as bird but only one was identifiable. In addition, there were six bone pieces that were either bird or rabbit bones. The bird bone, a carpometacarpus fragment, that was identified was a surface-feeding duck (*Anas* sp.).

Among the seven unidentifiable bird bone fragments, one fragment was a portion of a femur shaft which belonged to a large-sized bird, possibly a crane. Unfortunately the fragment was not large enough to speciate. There was also a femur fragment from a small-sized bird. The other bone fragments were portions of longbones.

Results from the Matrix Samples

The total number of bone fragments recovered from all three screen mesh sizes was 10,878. The largest screen mesh, 6.33mm, had 2069 (19.02%) fragments, while the 3.35mm mesh size had 8665 (79.65%) fragments. The smallest mesh material had 144 (1.32%) fragments. However, the bone material from the 850 micron screen represented a 20% sample of the total amount of material sieved. Also, only the bone that was possibly identifiable was collected for identification from this screen. In reality, this matrix sample had likely well over 10,000 bone fragments in it. However, it was so highly fragmented that it was not practical to attempt to quantify it. This total is therefore not reflective of the actual number of bone fragments found within the matrix screened with the 850 micron mesh size.

Totalling the results from the three screen sizes, the following table represents the number of bone fragments from each of the four classes:

TABLE 4.7 Proportions of classes from 1987 matrix samples

CLASS	NISP	%
Shell	0	0.00
Fish	52	0.48
Bird	721	6.6
Mammal	10,105	92.89
TOTAL	10,878	100.00

Bone fragments which were identifiable within these classes were relatively few. There were 102 (.94%) identifiable bone fragments and 10,776 (99.06 %) unidentifiable fragments. Table 4.8 illustrates the faunal remains recovered from the three matrix mesh sizes, including all identified taxa

Mammals

There were twelve taxa recovered from the matrix samples. The largest screen had six taxa; the 3.35mm screen had nine taxa; and the smallest screen had just one. The NISP from the 6.33mm screen mesh was 21 for identifiable bone fragments. The 3.35mm screen mesh had a higher NISP (N=66), and the smallest mesh had a NISP of one.

There were two large mammal represented in the 6.33 mm mesh sample collection. The moose had an NISP of four (MNI=2), and there was one bone fragment from a black bear (MNI=1). All other taxa from this mesh size were medium or small mammals. One taxa was identified to the genus level only, and it was a bone fragment from the *Canis* sp. The beaver had an NISP of eight (MNI=2), and the hare an NISP of 6 (MNI=1). Finally, there was one fragment from a marten from this screen (MNI=1).

More taxa recovered from the 3.35mm mesh size. The three added taxa were very small mammals, including the least chipmunk (NISP=1; MNI=1); the squirrel sp. (NISP=3); and the vole sp. (NISP=1). There was one species which represented medium-sized mammals, and it was the beaver (NISP=3; MNI=1). All other species were small mammals. The hare had the highest NISP, at 49 (MNI=2). Other species represented include the muskrat (NISP=2; MNI=1); the fox (NISP=4; MNI=1); the marte n (NISP=1; MNI=1); and the otter (NISP=1; MNI=1).

The only species identified from the 850 micron mesh size was the hare, with an NISP of one (MNI=1). All other fragments from this mesh size were too small to identify, or appeared to be bone fragments that could have been identifiable from voles or mice; I decided not to identify them due to time constraints and because their identification was beyond the topic of this thesis.

There were 2033 unidentifiable bone fragments recovered from the 6.33mm mesh size. While there were relatively few small to medium to large bone fragments, there were 251 large mammal bone fragments. The largest class size was just 'mammal,'

TABLE 4.8: Faunal remains recovered from matrix samples in 1987, including MNI and fragment count (per screen size)

SCREEN SIZE:	6.33mm		3.35mm		850 microns	
MAMMALS	NISP	MNI	NISP	MNI	NISP	MNI
Lepus americanus	6	1	49	2	1	1
Eutamia minimus			1	1		
Sciuridae			3			
Castor canadensis	8	2	3	1		
Ondatra zibethicus			2	1		
Microtus sp.			1			
Canis sp.	1					
Vulpes vulpes			4	1		
Ursus americanus	1	1				
Martes americana	1	1	1	1		
Lontra canadensis			1	1		
Alces alces	4	2				
TOTAL	21		66		1	
UNIDENTIFIED:						
Small	8		43		40	
Medium to small	7		8			
Medium	27		7			
Medium to large	2		1			
Large	251					
Mammal	1738		7885			
TOTAL	2054		8010		41	
BIRDS						
IDENTIFIED						
Anas americana			1	1		
Anas sp.	1		2			
Tetraoninae	1		2			
TOTAL	2		5			
UNIDENTIFIED	4		3		3	
TOTAL BIRD	6		8		3	
UNIDENT. BIRD/HARE	9		632		63	
TOTAL	15		640		66	

TABLE 4.8 (Con't)

SCREEN SIZE:	6.33		3.35		850 microns	
FISH	NISP	MNI	NISP	MNI	NISP	MNI
IDENTIFIED						
Coregonus clupeaformis				5	1	
Stizostedion vitreum (?)				2	1	
TOTAL			7			
UNIDENTIFIED			8		37	
TOTAL			15		37	
TOTAL FAUNA	2069		8665		144	

where the pieces were so fragmentary that it was not possible to identify the mammal's size.

Unidentifiable bone fragments from the 3.35mm mesh size totalled 7944. There were more small mammal bone fragments from this mesh than from the 6.33 mesh, where there were 43 bone fragments. Other size classes were few, except again for the mammal classification.

A total of 40 unidentifiable bone fragments were recovered from the 850 micron mesh size. No other size classes were recovered, which is due to the extremely small mesh size used.

Birds

Seven bone fragments were identified from three taxa from the different mesh sizes. Two taxa were identified from the 6.33mm mesh; a duck (NISP=1) and a grouse (NISP=1). One species was identified from the 3.35mm mesh size, namely a widgeon (NISP=1; MNI=1). Two other taxa were identified, including a duck (sp.) (NISP=2) and a grouse (sp.) (NISP=2). No identifiable bone fragments were recovered from the smallest screen mesh size.

There were four unidentified bird bone fragments recovered form the 6.33mm mesh, and nine bird or hare bone fragments. On the other hand, while there were only three unidentified bird bone fragments from the 3.35mm mesh size, there were 632 unidentified bird or hare bone fragments. This high total reflects the fact that the bones were highly fragmentary and extremely difficult to identify. It is possible that there are also some other small mammal bone fragments represented in this total. There were only three unidentified bird bone fragments from the 850 micron mesh size, and 63 unidentified bird or hare bone fragments.

Fish

No fish bones were recovered from the 6.33mm mesh size. However, there were several identifiable fish bones from the 3.35mm screen. Two species were identified: Lake whitefish (NISP=5), and walleye (NISP=2). However, the identification from the walleye is questionable, as the comparative collection utilized (from the University of Alberta) was not complete. The identifications were based on fish scales. There were no identifiable bones from the 850 micron mesh, but there were some scales although they were too fragmentary to identify.

There were eight unidentifiable fish bones from the 3.35mm mesh size. A much higher total, 37, was recovered from the 850 micron mesh.

DISCUSSION

Problems with the Faunal Assemblage

Archaeological assemblages, by their very nature, may carry interpretation problems. Not only can archaeological recovery techniques affect the quality and quantity of the assemblages, but also formation processes and taphonomic influences could have affected the faunal remains. It is therefore necessary to discuss these problems, in order to establish the reliability of the interpretations made on the basis of the faunal assemblages.

Several problems can arise due to the nature of the site. The first involves the role of domesticated dogs that were present at the Fort, and also wild carnivores such as wolves and wolverines in the vicinity. These animals could have altered the deposited faunal remains at the Fort by chewing and consuming the refuse. Indeed, there is evidence of carnivore chewing on some of the recovered bones where some epiphyseal ends have been chewed and/or have indented tooth marks in them. It is possible that many bones could have been destroyed or moved by these carnivores. However, based on a visual analysis of the assemblage, this activity likely minimally influenced the assemblages. Bones could also have been carried away by carnivores to be consumed somewhere offsite. While this is a viable situation, it is proposed that this activity minimally affected such a large site.

Cultural activities also need to be taken into consideration at this point. Given the long period of occupation at Fort Dunvegan, large amounts of food waste must have been controlled in some manner. Disposal patterns of the personnel would have direct results with regards to what would be found in archaeologicl context. Examples from the journals and from other references indicate that there are a variety of ways of how waste was disposed of.

Researching Fort Victoria, Pyszczyk stated that personnel at the Fort dug trash pits for disposal, had middens outside the Fort boundary, and that there were instances of men clearing up the Fort compound (1978:61). Schiffer, in speaking about cultural formation processes, stated that "[f]ire is a widespread occurrence often associated with certain formation processes, such as ... burning of refuse heaps" (1987:278). Indeed, Williams stated this to be the case at Fort d'Epinette, where she found that the "...burning of bone was not uncommon and has produced sizeable quantities of charred and/or calcined bone" (Williams 1978:73).

Regarding Fort Dunvegan, statements in the historic documents indicated some of the above cultural activities. There were frequent entries in the journals such as the following: 30 April, 1806 "Several men were employed cleaning about the fort" (HBA B.56/a/1). This was a common activity, and cleaning took place both within and outside the fort walls. However, no mention is made of where the refuse was actually disposed of, and whether it was burnt or buried. Indirect evidence involves the zooarchaeological record, where there were some burnt bones recovered. However, these bones could have been burnt accidentally, such as by a local forest fire and possibly post-occupationally, and not purposefully during Fort occupation.

Overall, evidence for disposal patterns at Fort Dunvegan was scarce. While it is known that cleaning up of the compound took place, it is not known where the refuse was disposed of. It is possible that refuse was burnt, or that it was disposed of somewhere off the compound (i.e., in the River). However, given the large amounts of faunal remains still present at the site, and the fact that some of the results from the faunal assemblage closely parallel those form the documents, suggests that disposal patterns may not have been too destructive to the refuse generated from subsistence activites.

Architectural data recovered from the 1982 excavations revealed complex features. Construction at the Fort as well as the moving of the buildings have influenced the faunal assemblages. A number of palisade footer trenches as well as fences in the interior of the Fort were found. Plates 4.1 and 4.2 illustrate some architectural features, particularly post-molds, which indicate fence lines. Apparently it was difficult to determine the relationship of the features to one another, as they represent the long occupation of the Fort and the various structural changes that took place over time.

Pyszczyk was able to locate "parts of the northeast, southeast, and southwest Fort corners" (1982:30), from remains that suggest the presence of buildings such as sills, hearths, and cellars (9182:31). Building remains were found near the west wall, and also near the north wall. Figure 4.6 shows "the relative positions of buildings and stockades shown in the 1875 Fort Dunvegan map compared to archaeological features" (Pyszczyk 1982:34). This figure is only an approximation, however, because while some buildings do accord well with the results from the excavations, others do not match as well.

It was found that some disturbance did occur from post-occupational activities, but while this disturbance had damaged "...the upper portions of the early fur trade site...there are still some relatively well preserved building remains, and deep subsurface features such as footer trenches and cellars are virtually intact" (Pyszczyk 1982:109). However, preservation of "structural features is sporadic; in some parts of the Fort, building remainss are well preserved, while in other areas, only the general locations of buildings are likely identifiable from the archaeological data" (Pyszczyk 1982:114). In spite of this, it appears that sufficient information was obtained from the archaeological investigations to enable Pyszczyk to determine the approximate location of the buildings, particularly with the aid of historic maps.

The 1982 excavations were primarily aimed at recovering architectural data; as such, the excavations did not emphasize obtaining a representative sample of faunal and artifactual remains. The units were very narrow, and were placed subjectively within the concerned area. Also, the matrix from the units was not always totally screened, and sometimes not screened at all. This could create a sample of faunal material wich may not be totally representative of past subsistence activities.

Because the site has been actively plowed for well over 60 years, much of the the original provenience of the faunal assemblage may have been changed, and it is possible that many bones could have been broken and/or destroyed by the plow. The more fragile bones, from smaller mammals, birds, and fish, could have been destroyed over time. Original butchery patterns may also be no longer evident, because of new breakage patterns created by the plow.

The 1987 surface collection was conducted over only a portion of the site. The collection therefore may not be totally representative of the whole site. In addition, the nature of the collection itself could have produced a bias towards larger faunal remains. Because larger faunal remains are more easily visible than the smaller ones, it is likely that a proportionately greater number of larger remains were recovered than smaller faunal remains. In looking at the species list containing the NISP and MNI of the faunal assemblage recovered in 1987, very few small mammal and bird remains were recovered, and no fish bones were found. One hundred hare bone fragments were recovered during the 1982 excavations, but only one hare bone was found during the surface collection. This is likely due to the fact that they were visually missed because of their small size.

Results

With reference to the three hypotheses which have been previously discussed, data for two out of the three have been provided through this archaeological analysis.

The data necessary for Hypothesis One had to be separated into different categories. It was necessary to differentiate between species utilized for human consumption and those utilized as part of the fur trade, although these two groups are not mutually exclusive (Rick 1983:249).

Rick (1983:247), in a study of the faunal remains from Nottingham House, was able to determine what the role was of certain species by quantifying the elements of each species found at the site. She divided carcasses into four portions: the head (skull); the vertebrae (the vertebral column); proximal elements (scapula, humerus, radius/ulna, femur, tibia); and distal elements (carpals, tarsals, metacarpals, metatarsals, and phalanges). She stated that if the whole carcass was brought to the site, then at least three or more body portions should be found (Rick 1983:247). If similar criteria are applied to Fort Dunvegan, significant information can be revealed concerning several species recovered at the site (see Table 4.9). Cow and horse were omitted from the analysis, as they were both domesticates and would not abe hunted as wild game. The information found in Table 4.9 helps to determine whether whole carcasses were brought to the Fort, or if only specific portion of the mammals were brought in, such as those portions of the body bearing the most value in terms of meat, marrow and/or bone grease.

In looking at the large mammals, the moose is represented by all major body parts - that is, by the head, vertebrae, and proximal and distal limbs. The bear is the only other species which is also represented by skull fragments. The wapiti, and *Bison/Bos* (sp.) are represented by vertebra and other limbs, suggesting almost complete carcasses were brought to the Fort. All of the above mammals would have been utilized for subsistence at the Fort, and all of their furs/hides were valuable for trade purposes. The moose was the

TABLE 4.9: Elements present from 1982 identified faunal assemblage (after Rick 1983)

SPECIES	# OF PIECES	HEAD	VERT.	PROX.	DISTAL
Moose	57	X	X	X	X
Bison	5			X	X
Wapiti	15		X	X	X
Bison/Bos	2		X	X	
Deer sp.	1				X
Deer	5			X	X
Bear sp.	7	X			X
Bear	15	X		X	X
Beaver	97	X	X	X	X
Wolverine	8		X	X	X
Lynx	18	X		X	X
Canis sp.	12	X		X	X
Hare	100	X	X	X	X
Red fox	24	X		X	X
Muskrat	1			X	
Marten	3	X			X

Note: distal elements include: carpals, tarsals, metacarpals, metatarsals, and phalanges
proximal elements include: scapula, humerus, radius/ulna, femur, and tibia
vert. elements include the complete vertebral column

major species relied upon for food, and the wapiti and bear to a lesser degree, and then the bison and deer occasionally.

Looking at the medium-sized mammals in Table 4.9 one can see that the beaver is represented at the site by all major elements, both axial and appendicular. It is also the most numerous. This animal played a major role in the fur trade, so it is not surprising to find its high occurrence. The fact that it was brought to the site as a carcass and not just as a prepared hide strongly indicates its use a food resource as well.

The lynx and *Canis* (sp.) both have skull portions represented at the site, but with relatively few proximal elements, and more distal elements. It is possible that these two species were primarily brought to the Fort in the form of hides, with perhaps some elements, such as phalanges, still attached to the hide. The wolverine is represented by more appendicular elements than axial. The two axial elements were one atlas and one caudal vertebra. The caudal vertebra may have been attached to the hide. Other elements include carpals and phalanges, as well as one ulna fragment and one metapodial fragment, thus also suggesting that some elements may have been attached to hides brought in for trading.

There were four small mammals represented at the site - hare, red fox, muskrat, and marten. The hare is represented by both axial and appendicular elements, indicating that hares were likely brought to the Fort in the form of a complete carcass. The other three small mammals are more problematic. The muskrat is only represented by few elements, and the red fox and marten both had skull portions at the site, but with very few proximal elements and more distal elements. This again suggests that these species may have been used more in a role in the fur trade and not for subsistence (i.e., byproduct of pelt production).

In summary, many of the species were primarily utilized for the meat they provided, but their hides may also have been used. These include all the large mammals: the moose, wapiti, bison, deer, and black bear. Thus a large percentage of the diet, based on this data consisted of large mammals. The only small mammal which appears to have been utilized for food, based on the archaeological data, was the snowshoe hare. The beaver would have been primarily sought for its fur, but it was also eaten: "Beavers were eaten by fur traders as well as Indians..." (Rick 1983:245). The other mammals, the wolverine, lynx, *Canis* (sp.), red fox, muskrat, and marten, would have been primarily sought for their furs, although they also may have been occasionally eaten, particularly by the Natives, or when "preferred food was unavailable" (Rick 1983:245).

Data were not obtained for Hypothesis Two. This hypothesis dealt with the percentage of boneless meat which was traded with Fort Dunvegan, and which was consumed on site. While it was known that this trade did indeed occur, this form of food would, of couse, leave no archaeological residue.

Hypothesis Three involved the analysis of which species were utilized at Fort Dunvegan, and in what frequency. This can be compared to the foregoing species list created from the analysis of the faunal assemblages from the Fort. By combining the species lists obtained from the 1982 archaeological excavations, and the 1987 surface survey and collection, a more accurate reflection of species utilization can be obtained.

As can be seen in the tables (4.3; 4.6 and 4.8) the moose was the most numerous of the large mammals. Beaver was represented by a high number of fragments as was the snowshoe hare. While some bison elements were recovered from Fort Dunvegan, they were in very low frequencies. This is somewhat surprising, as some researchers believe that many fur trade posts subsisted primarily on the bison. While this may be true for more southern-located posts, this appears to not be the case for northern posts, at least for Fort Dunvegan. This assemblage indicates that the moose was likely the primary mammal. Interpretations based on the assemblage indicate that the wapiti was also utilized, along with deer , and bear. Evidence suggests that the Fort had two domesticates: the cow and the horse.

Smaller species recovered from the faunal assemblage include the beaver, the lynx, the red fox, the marten, the muskrat, the otter, and the snowshoe hare. Some of these species may not have been consumed by the residents of Fort Dunvegan; rather, their sking were traded by the Natives with the Fort. Hare and beaver were both used for subsistence, on the basis of this assemblage.

A number of wildfowl elements were also recovered from the Fort Dunvegan faunal assemblage. This included a high number of ducks. There were also grouse elements recovered from the site, and some goose. This would indicate that wildfowl, including both water and land birds, were utilized for subsistence at the Fort, and were perhaps an important source of meat. A high number of unidentifiable bird bone fragments were also recovered. The numbers of identified bird species may actually under-represent the total amounts of birds utilized for subsistence. However, at the same time, the fragments may not be all that indicative of frequencies because the pieces are so fragmentary that they may represent few birds.

Very few fish bones were recovered. The most numerous species was the lake whitefish, and there were two scales from the walleye. There were other unidentifiable fish bones recovered from the matrix samples, but there were surprisingly few actually present in the assemblage. This indicates that the fish bones were present in very low numbers on the site, and that it was not the initial recovery techiniques that biased the results.

CHAPTER FIVE

DISCUSSION AND CONCLUSIONS

INTRODUCTION

As stated in the introduction, the aim of this study is to identify certain behaviours, as part of an active cultural system, which may have affected the formation of the faunal assemblage at Fort Dunvegan. Because the emphasis concerns primarily the faunal assemblage, the concentration is therefore on past subsistence activities and patterns, particularly those activities involved in obtaining and processing wild game. Of interest is how resulting zooarchaeological remains are dealt with in systemic context, in order to clarify the information obtained from the archaeological context.

The three previously discussed hypotheses form the basis for the following discussion. As noted earlier, these were established on the basis of the analysis of the historic documentary records available from and concerning Fort Dunvegan. They concern specific behaviours that were recorded in these journals in relation to past subsistence practices. In the following analysis, each proposition will be discussed individually. Data from the journals and from the archaeological excavations will be compared in order to identify specific subsistence patterns as well as other certain activities that may not be evident in either the archaeological record or in the written journals.

Hypothesis One:

> 'Contract' and 'Coincidental' food trade by Natives was a significant portion of Fort Dunvegan's subsistence and that these two types of trade can be identified in the zooarchaeological record.

Two forms of trade were identified and discussed in Chapter Three: Contract and Coincidental trade. It was found that each had a distinctive pattern that resulted in a specific category of faunal remains. It appears that the Fort Hunters mainly provided large mammals, especially moose. Alternatively, mammals brought to the Fort through Coincidental trade produced more medium and small mammals, although some large mammals were also contributed. What is significant is whether or not these two different types of trade could be reflected in the archaeological faunal assemblage.

While the journals clearly delineated two types of trade, and the differences between them, it was not so clearcut in the faunal assemblage. There is nothing in the frequencies of medium and smaller mammals, or in the analysis of birds and fish, to indicate whether they were brought to the Fort through either Contract or Coincidental trade. Indeed, for some species, there is only a suggestion that they are indeed present at all. Regarding the larger mammals, however, there are some possible indications of the types of trade from the assemblage. First, with reference to species of large mammals as opposed to smaller mammals, there is no indication in the faunal assemblage of whether they were brought to the Fort through Contract or Coincidental trade. This pattern of subsistence established at Fort Dunvegan involving specific behaviours is simply not reflected in the assemblage. On the other hand there are some indications of the different types of trade in the elements of the larger mammals. As discussed in Chapter Three, the Hunters were instructed to eat only certain portions of their kill, including the head, neck, and boss. Portions of the animal that were returned to the Fort would include the longbones (i.e., humerus, radius, ulna, metacarpal, carpals; and femur, tibia, metatarsal, and tarsals), the shoulders (the scapulas), and the ribs. A certain butchery pattern would have been established from the Fort Hunters, and it was clear that some elements in the assemblage did not 'fit' this pattern. This could then indicate food coming to the Fort from another source, likely Coincidental trade where Natives were not under the above obligations. Odd cuts of animals, such as a few longbones or a portion of the boss, may have been brought to trade at the Fort by other Natives.

Also, from the assemblage, one could infer that frequencies of mammals could be indicative of the presence of two forms of trade. For example, based on the journals the Hunters hunted primarily moose, wapiti, and bear. However, there was a variety of other large mammals recovered in the assemblage. This could indicate another group of individuals who were bringing food to the Fort, likely through Coincidental trade. Thus the presence and frequency of certain speices could indicate this form of trade. This trend is not strongly reflected, though, and future studies should look into it further.

Hypothesis Two:

> A high percentage of food brought to the Fort was in a boneless form (i.e., dried meat), and therefore would not be reflected in the archaeological record.

As stated in Chapter Three, the data discussed under this hypothesis include animal remains which were processed before they were brought to Fort Dunvegan. They include dried meat, pounded meat, and grease. It was found in the documentary evidence that large amounts of unquantifiable provisions were brought to the Fort. While the Hunters brought in fresh meat for the majority of the time, Coincidental trade brought in mostly meat in a preserved form ('provisions'). This could equal well over a thousand pounds at a time.

Based on the account books, it appears that at least 10% to 20% of the Fort's diet was meat in a preserved form, while the remaining meat was fresh. This included consumption by the personnel, visitors, and even the domesticated dogs. While this is not a large percentage of food, it is still significant when attempts are made to reconstruct as wholly as possible past diet and subsistence practices of this Fort. It is unlikely that species present would differ markedly between the records and the assemblage, but quantities of meat certainly would be different.

If one were to look to the archaeological record to see if this particular situation is accurately reflected, it is obvious that the record is totally inadequate. Because this form of food has no preservable portions, it will not be reflected in the archeological faunal assemblage. It is possible that certain artifacts may infer the presence of certain forms of food, such as pounding stones to break down dried meat strips, but it is unlikely in this case. Therefore the role of boneless meat is an important one. At Fort Dunvegan, up to 20% of the diet was preserved food, and possibly more. Therefore the MNI in the archaeological assemblage may be expected to underestimate the number of certain species by at least 20% and likely much higher. At other forts, this percentage may be even higher. Thus if archeologists are attempting to reconstruct the diet of a particular group, they must consider the role of the possible presence of this food. Inaccurate interpretations will otherwise be made.

Hypothesis Three:

> The type and numbers of animals consumed by members of Fort Dunvegan can be ascertained from historic journals, and the documented boned meat will be accurately reflected in the faunal record.

In Chapter Three, a ranking list of species importance was established (Table 3.4) that represents all species of mammals, birds, and fish which were discussed in the Fort Dunvegan journals. The moose, red deer (wapiti), and bear were the three most numerous large mammals, while beaver, hare and fox were among the most frequent in terms of medium and small mammals. Wildfowl had a high MNI, as did fish.

Looking at the recovered faunal remains, Tables 4.3, 4.6 and 4.8 represent the NISP and MNI of all species recovered from the 1982 and 1987 archaeological excavations. The moose was represented by the highest frequency of large mammal bone fragments, and also had one of the highest MNI estimates. The wapiti, bison, and black bear also had relatively high NISP frequencies. With reference to smaller mammals, the beaver, red fox, hare, and also lynx had high NISP frequencies. Some wildfowl remains were also recovered, mostly representing surface-feeding ducks. Only a few fish bones were recovered which were identifible. It can be seen that the MNIs of all the species was quite low.

When a comparison of these two data sets is conducted, and looking at just the ranking of the species, there are surprisingly a good number of similarities. For example, the moose was indicated to be the most numerous in both the historic documents and the faunal assemblage. The wapiti and the bear were also indicated to have been frequent, as was also the deer. One difference between the two sets of data, however, involved the bison. The faunal assemblage contained a number of bison bones, indicating an MNI of at least two bison being brought to the Fort. In contrast, the historic documents did not indicate bison as being brought or consumed at the Fort; there were indirect inferences, though, of occurrences of men going hunting for bison.

Referring to smaller mammals, the beaver, hare and red fox were all frequent in the two data sets. Once difference in the ranking involved the wolf. The journals indicated that the wolf was relatively high in the ranking of species, but this ranking was not visible in the faunal assemblage. This is partly due to the difficulty of identifying domestic dog bone remains from wolf bone remains. Another difference between the data sets involved two species of mammals which were recovered archaeologically, but which were not mentioned in the journals. These are the muskrat and the river otter. It is likely, though, that these species were brought to the Fort as skins, and were therefore not included in the records concerning subsistence.

Of interest is the frequency of wildfowl as compared between the two sets of data. While a discussion of the ranking of individual species is not possible because the journals grouped the birds as "wildfowl", the MNIs in general can be compared. In the historic journals there was an MNI of 263 wildfowl, likely brought to the Fort as complete carcasses. This contrasts markedly with a low MNI of wildfowl in the faunal assemblage. This is a considerable difference. If one was only using the archaeological faunal assemblage to reconstruct past diet, then a very biased view would be created, one in which mammals constituted the major source of animal protein. However, in reality it appears that this was not the case. Recovery techniques may be an explanation, or it may be a reflection of local specialized disposal patterns. However, recovery techniques for this site were thorough and the fine-screened matrix indicated that wildfowl remains were present in only limited numbers. It is likely, therefore, that the lack of wildfowl in the archaeological assemblage was due to either taphonomic factors or unknown cultural activities.

A final word should be stated about the fish consumed at the site. The archaeological assemblage reflected very poorly the consumption of this food source, despite the fact that it was clear that fish was consumed on the basis of the journals. This again is likely not a factor of the recovery methods utilized at Fort Dunvegan because of the intensive matrix samples analysis. Other reasons for their absence could include that fish may have been fed to the dogs, resulting in few surviving remains. Also, fish bones deteriorate faster than the harder bones of the mammals, and thus differential preservation may also be a factor.

Overall, the two data sets reflected approximately the same ranking of species of animals. What is quite different, however, is the MNI represented between the journals and the faunal assemblage. It is clear that the journals produced much higher MNI's than the assemblage. The ranking may be similar but there are clear differences in the quantities. For example, even though the moose ranked the highest as a large mammal in both data sets, there was only an MNI of seven for the moose in the assemblage, when there was an MNI of at least 231 from the journals. This is an extreme difference; a similar pattern can be seen with other species as well. This is important because it indicates that there may be little relationship between archaeological MNIs and the reality of the situation (as indicated by the documents), at least for frontier fur trade posts. The archaeologial faunal assemblage is thus inaccurate in terms of representing actual numbers of animals of each species brought to the Fort.

IMPLICATIONS FOR FUTURE STUDIES

Several conclusions can be made on the basis of this study, some of which may be applicable to other sites, including historic and prehistoric ones. Of particular interest is the role of boneless meat that was brought to Fort Dunvegan, and which was either consumed on site or used for voyages. The other point which should be discussed is the need for adequate representative samples of faunal remains, especially those from historic sites.

The results from the documentary analysis indicated that there are some food sources coming into Fort Dunvegan which do not have any archaeological representation. This has implications for studies of other fur trade sites, as it is likely that similar trade situations may have existed where Natives were relied upon for large percentages of the forts' food. For example, during a faunal analysis, the absence of certain bone elements from an assemblage may be interpreted as a function of natural destructive processes. However, as this study indicates, it is just as likely that the bones were never part of the archaeological record in the first place. Moreover, differences in the MNIs between archaeological and documentary sources suggest that over-reliance on the former may lead to underestimations of the quantity of subsistence resources cycling through the site. In short, inaccurate interpretations may be made.

It would be very easy to concentrate only on what the results from this study would mean to other historic sites, particularly fur trade forts. However, there are implications towards the study of proto-historic Native campsites. If large amounts of food were being brought to historic fur trade forts were in a dried form, including large amounts of grease, then the bones from these foods would be found where they were processed -- in the Native's campsites. Therefore, if an analysis of these Native sites were to take place, it is necessary to take into consideration that it is possible that a large percentage of the faunal assemblage recovered from such a site would not represent actual subsistence and consumption patterns of that particular group of people. Rather, the situation may be that large amounts of food processed at that site were carried or moved elsewhere and that the production and consumption of this food may not overlap. Therefore caution must be taken when studying these types of sites.

The final note which must be mentioned is the significance of obtaining representative faunal assemblages. As stated previously, many researchers have indicated that small mammal, bird, and fish bones may be entirely missed if the matrix is screened with only a 1/4 inch mesh size. They emphasize the importance of obtaining matrix samples to fine-screen them. My results indicate that this may not always be necessary. The fine-screened samples from Fort Dunvegan have shown that recovery techniques did not produce significant differences between the 1982 collection (that was 1/4 inch screened) and the surface collection and matrix samples from 1987. Based on these results, previous findings from other sites in which fine-screening was not done may not necessarily invalidate their respective results. Likewise, there may be future instances in which specific sites may not require this fine-screening either. This could be highly variable, however, and fine-mesh screening should not be abandoned altogether. The results from Fort Dunvegan are site specific and may not necessarily be extrapolated to other sites, yet they were significant enough to question seriously the role and usefulness of fine-screening at other sites.

CONCLUSIONS

Specific behaviours concerning past subsistence patterns and adaptations were identified by analysing the historic fur trade journals of Fort Dunvegan. The Fort personnel relied heavily upon Fort Hunters to subsist and run a business in an environment which was foreign to them and required flexibility and mobility in a permanent occupancy situation. Two forms of trade were identified, namely Contract and Coincidental. These two forms produced different species of animals for food, and Coincidental trade also brought a great deal of dried provisions to the Fort. These dried provisions were essential towards the functioning of the Fort, and to transfer furs to the east.

Three hypotheses were discussed with reference to determining whether specific behaviours identified from the journals were reflected in the archaeological faunal assemblage. It was found that some activities, such as the trade and consumption of dried meat, were not reflected in the faunal assemblage. However, the ranking of animal species consumed at the Fort was approximately the same between the two sets of data. It is clear, though, that the MNI of each species represented differs radically between the historic documents (very high MNI for some species), and the faunal assemblage (relatively low MNI's). The specific differences between the two types of trade were not obvious in the information obtained from the faunal assemblage. Indeed, there are only slight suggestions that Coincidental trade may have occurred, whereas in the documentary evidence it appears that it was very important. Thus while the faunal remains may reflect subsistence, they do not necessarily reflect trading practices nor quantities of species (MNI).

Overall the historic documents and the archaeological faunal assemblage indicated that there are some inconsistencies between the two sets of data. A number of cultural formation processes, in terms of specific subsistence activities, were not reflected in the assemblage. On the other hand, the combination of the two sets of data more clearly identified the subsistence base. Where there were certain amounts of vagueness in the historic journals, the faunal assemblage was able to produce more specific amounts of data, and thus they were both beneficial. It is clear that neither source of data is without its problems. Also, it is clear that the faunal assemblage from a fur trade post is not always representative of the range of past subsistence related cultural behaviours. Cultural formation processes must be taken into consideration when analysing these, and probably other assemblages as well.

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APPENDIX A

Excerpts From the Fort Dunvegan Account Books

The following information is excerpted from a number of account books from Fort Dunvegan. It is by no means complete; only data pertinent to this study have been presented here.

ACCOUNT BOOK 1832-33 (B.56/d/1)

Supplied New Caledonia
Sept. 22, 1832:
5 Bags Pimican 450 lbs light Canoes
461 lbs dryed Meat light Canoes
Dec. 9, 1832:
90 lbs Pimican Paul Fraser
450 lbs dryed Meat Paul Fraser
Dec. 16, 1832:
530 dressed Moos Skins
20 dressed Moos Skins _?_ the men
8 dressed Moos Skins Lodges
20 Parchment Moose Skins
32 pairs indian shoes
100 lbs Babich
35 lbs Sinews
232 lbs Pack Cords
884 lbs Grease
10 lbs Grease for boat
10 Bags Pimican 900 lbs
680 lbs dryed meat
178 lbs dryed meat en Rations
50 lbs Gum

Supplied Fort Chipewyan
1833:
May 1: 24 Kegs Potatoes
Moos Skins dressed

Supplied Slave Lake
May 1, 1833
6 Kegs Potatoes
1 Keg Barley
2 dressed Moos Skins

Supplied Vermilion
May 1, 1833:
12 Kegs Potatoes
3 Moos Skins

Inventory on Hand, May 1833:
(among other things)
Country Produce:
600 lbs Pounded Meat for New Caledonia
474 dressed Moos Skins for New Caledonia
40 Parchments Moos Skins for New Caledonia

ACCOUNT BOOK 1841-42 (B.56/d/2b)

- of note: servants could obtain a number of things from the Fort, which were then debited from their individual accounts. This included dressed Moose Skins, butter, and sometimes Grease or other skins (i.e., reindeer).

To Dunvegan, To Sundries Supplied from Fort Chipewyan
270 large dressed Moose Skins
180 lbs Pack Cords
150 lbs Babiche
30 lbs Sinews
2 Kegs Salt
2 Bags Common Pemican
120 lbs dried Meat
6 lbs Grease

To Dunvegan, from Fort Vermilion
1 1/2 Bag Pemican
180 lbs dried Meat
60 lbs Pack Cords
26 large Parchment Moose Skins
2 large Parchment Rein deer Skins

To Dunvegan, from Lesser Slave Lake
July 21, 1841:
25 lbs Pounded Meat
15 lbs Pack Cords
1/2 lb Gunpowder
1 lb Shot
Dec. 8, 1841:
15 lbs common Pemican

To New Caledonia District, from Dunvegan
406 large dressed Moose Skins
12 large Parchmt Moose Skins
30 lbs Sinews
17 lbs Babiche
270 lbs Pack Cords
900 lbs Grease
76 lbs made Gum
7 Bags common Pemican
56 lbs Fine Pemican
40 lbs dried Meat
96 lbs fresh Meat
1 large North Canoe
28 pr. Indian Shoes

To Western Missionary Society, from Dunvegan
Dec. 8, 1841:
398 lbs dried Meat
96 lbs Pemican
30 lbs Fine Pemican
5 Moose deer Tongues
94 lbs dried Meat to return men to L.S. Lake

To Fort Chipewyan, from Dunvegan
Oct. 10, 1841:
- 54 lbs dried Meat
- 60 lbs dried Meat
- 6 Moose deer Tongues
- 1 large dressed Moose Skin

May 8, 1842:
- 12 Bags common Pemican
- 4 Bags Fine Pemican, 2 Berries
- 445 lbs Butter
- 2 Kegs Barley
- 3 Leather Lodges, 16 new Skins
- 6 Leather Lodges Skins
- 12 Pemican Bags

ACCOUNT BOOK 1842-44 (B.56/d/3)

To Fort Chipewyan, from Dunvegan
- 2 young oxen, 2 years
- 2 Heifers, 2 years
- 2 Heifers, 2 months
- 48 lbs fresh Meat
- 18 lbs Beat Meat

Aug. 7, 1842:
- 1 Keg Butter, 80 lbs nett wgt.

May 8, 1842:
- 338 lbs Grease
- 1 Fine Pemican Berry
- 1 Fine Pemican
- 4 Bags common Pemican
- 6 Kegs Butter 528 lbs nett wgt.
- 26 Salt Moose Tongues
- 13 Pemican Bags
- 10 large Parchment Moose Skins

To Dunvegan, sundries supplied from Ft. Chipewyan
- 20 lbs Oakum
- 1 Sea deep Line
- 30 Rat Spears
- 2 Bags Pemican
- 90 lbs dried Meat
- 18 lbs Babiche

To Dunvegan, supplied from Ft. Vermilion
- 2 Bags Pemican
- 135 lbs dried Meat

To Dunvegan, from Lesser Slave Lake
June 9, 1842:
- 800 lbs Grease
- 9 lbs Pack Cords
- 14 lbs Pounded Meat

ACCOUNT BOOK 1844-45 (B.56/d/4)

New Caledonia District, sundries from Dunvegan
Oct. 18, 1844:
300 large dressed Moose Skins
20 large Parchment Moose Skins
226 lbs Grease
210 lbs Pack Cords
60 lbs Babiche
20 lbs Sinews
122 lbs Gum
305 lbs dried Meat
8 Bags common Pemican
60 lbs fine Pemican
50 lbs fine Pemican
116 lbs fresh Meat
20 lbs Grease
Nov. 12, 1844: Supplied to Mr. McLean and party for their trip to return to New Caledonia
7 lbs Pack Cords
2 lbs Babiche
2 Cote de Boeuf
3 large dressed Moose Skins for Guncovers and Mittens
1 large dressed Moose Skin for Snowshoe cords
484 lbs fresh Meat rations to men while at the Fort
144 lbs fresh Meat rations to dogs
155 lbs dried Meat rations to dogs
493 lbs dried Meat for voyage
Jan. 17, 1845:
90 lbs dried Meat to men going for Leather en cache

To Dunvegan, sundries supplied by Fort Vermilion
Aug. 1, 1844:
150 lbs Pounded Meat
30 lbs dried Meat
30 lbs fresh Meat
205 lbs Pack Cords
Oct. 1, 1844:
396 lbs dried Meat
90 lbs Pemican
146 large dressed Moose Skins
48 small dressed Moose Skins
Mar. 24, 1845:
60 lbs Pemican
May 9, 1845:
102 lbs dried Meat

To Fort Chipewyan, from Fort Dunvegan
1844:
16 Leather lodge skins
20 Moose deer Tongues
6 Kegs Butter 450 lbs

ACCOUNT BOOK 1844-45 (B.56/d/4), Con't

To Fort Vermilion, from Fort Dunvegan
Apr. 29, 1845:

- 1 lb Gunpowder
- 1 lb Ball Shot
- 1 lb BB shot
- 3 horses

The Royal Society (debit), To the Hudsons Bay Company for the following supplies to J.H. Lefroy Esq. at the Post of Dunvegan, Athabasca District
July 27, 1844:

- 108 lbs Pemican
- 30 lbs fine Pemican
- 20 lbs dried Meat
- The ride of 7 horses 6 days

ACCOUNT BOOK 1845-46 (B.56/d/5)

Debit Dunvegan, sundries supplied by Fort Chipewyan
May 27, 1845:
- 80 lbs Pemican
- 34 lbs dried Meat
- 4 lbs Grease
- 26 reindeer Tongues
- 50 nails sharps
- 100 lbs Pack Cords
- 40 lbs Babiche
- 1 dble Cod Line

Debit Dunvegan, sundries supplied by Fort Vermilion
June 15, 1845:
- 90 lbs dried Meat
- 127 large dressed Moose Skins
- 60 small dressed Moose Skins

Debit Fort Chipewyan, sundries supplied by Dunvegan
Apr. 30, 1846:
- 240 lbs fine Berry Pemican
- 4 Kegs Buter, 318 lbs nett weight
- 16 Moose deer Tongues

Debit Portage la Loche Establishment, sundries supplied by Dunvegan
Apr. 2, 1846:
- 26 Horses
- 6 large dressed Moose Skins
- 2 Bags Pemican
- 12 Saddle Bags
- 10 Saddle Bags Girths
- 25 Saddles

Debit New Caledonia District, sundries supplied by Dunvegan
Aug., 1845:
- 103 large dressed Moose Skins
- 20 large Parchment Moose Skins
- 774 lbs Grease
- 40 lbs Babiche
- 15 lbs Sinews

ACCOUNT BOOK 1850-51 (B.56/d/6)

Debit Fort Chipewyan, sundries supplied by Dunvegan
Aug. 14, 1850:

- 1 Stallion
- 6 lbs Pack Cords
- 68 lbs dried Meat
- 203 lbs Butter
- 9 Bags common Pemican
- 1 Bag fine Pemican

Debit Fort Vermilion, sundries supplied by Dunvegan
Aug. 14, 1850:

- 2 Cows
- 1 Bull
- 1 Horse
- 67 lbs dried Meat
- 14 lbs Pack Cords

Debit New Caledonia District, sundries supplied by Dunvegan
Aug., 1850:

- 300 large dressed Moose Skins
- 20 small dressed Moose Skins
- 10 Bags Grease, 90 lbs ea.
- 12 Bags Common Pemican
- 100 lbs Babiche
- 20 large Parchment Moose Skins
- 4 small rein deer
- 200 lbs Pack Cords
- 20 lbs Sinews
- 1 Bag fine Pemican
- 90 lbs dried Meat
- 72 lbs fresh Meat
- 10 lbs Gum
- 6 lbs Grease

Debit Dunvegan, sundries supplied by Fort Chipewyan, 1850:

- 5 common Buffaloe Robes
- 1 old Net
- 100 lbs Babiche
- 4 small rein deer Skins
- 20 large dressed Moose Skins
- 137 lbs Pack Cords
- 1 Fishing Lines
- 50 rein deer Tongues
- 100 lbs dried Meat
- 30 lbs Pemican

Debit Dunvegan, sundries supplied by Fort Vermilion
June 20, 1850:

- 100 lbs Pemican
- 41 lbs dried Meat
- 12 Parchment Moose Skins

June 20, 1850: con't
- 49 lbs Pack Cords
- 4 lbs Gum

Oct. 1, 1850:
- 125 large dressed Moose Skins
- 15 small dressed Moose Skins
- 270 lbs common Pemican
- 180 lbs dried Meat
- 35 lbs dried Meat
- 100 lbs fresh Meat
- 20 lbs dried Meat for families

Debit Dunvegan, sundries supplied by Lesser Slave Lake
- 10 Bags common Pemican
- 10 Bags Grease, 90 lbs each

ACCOUNT BOOK 1863-64 (B.56/d/11)

WAGES ACCOUNT

Names	Capacity	Time Expires
Officers		
James V. Dunlop	Clerk	1865
William Shaw	P.M.	1864
Men		
Louison Courteoreille	Midm'n	1864
Charles Dumas	Steersman	1864
J.Bte. L'Amoureux	Fisherman	1866
Antoine La Liberte	Midm'n	1864
Jn Bte La Fleur	Interptr	1864
Angus Macaulay	Midm'n	1865
Jose Menge	Midm'n	1866
Pierre Pepin	Midm'n	1864
Edward Picken	Midm'n	1866
Richard Trindell	Midm'n	1864

Fort Chipewyan debit to Fort Dunvegan for the following supplies
May 1, 1864:
- 43 large dressed Moose deer Skins
- 5 small dressed Moose deer Skins
- 40 large parchment Moose deer Skins
- 24 Pemican Bags
- 3/4 Keg dried Berries

Fort Vermilion debit to Fort Dunvegan for the following supplies
June 20, 1863:
- 1 Bull, 1 yr. old
- 2 Oxen, 2 yrs. old

May 7, 1864:
- 672 lbs pounded Meat

Fort Dunvegan debit to Fort Vermilion for the following supplies
June 28, 1863: for 2 Indians 'en route' to Fort Chipewyan
- 22 lbs dried Meat
- 2/3 lbs Gunpowder
- 1 lb Tobacco

July 7, 1863: for Mr. Dunlop and Crew
- 50 lbs dried Meat
- 7 lbs Grease

Aug. 11, 1863: supplies to summer boat
- 1 Bag common Pemican, 90 lbs
- 270 lbs dried Meat
- 80 lbs dried Meat
- 52 lbs fresh Meat
- 12 lbs Grease
- etc.

ACCOUNT BOOK 1863-64 (B.56/d/11). Con't

Fort Dunvegan debit to Fort St. Johns for the following supplies
Mar. 31, 1864:
    250 Boards, 12 ft X 7 ins X 1 in
    200 Boards, 12 ft X 7 ins X1 1/2 in
    150 Building Logs 10 ft long
    40 large parchment Moose Skins
    4 Kegs Potatoes

Fort Dunvegan debit to Lesser Slave Lake
June 8, 1863:
    5 full grown stallion
    1 colt ,2 yrs.

Fort Dunvegan debit to Fort Chipewyan for the following supplies, viz.
July 30, 1863:
    20 lbs assorted Babiche
    10 large dressed Deer Skins
    1 Bushel Salt
The following for Mr. Dunlop:
    40 lbs dried Meat
    15 reindeer Tongues
The following for boat's crew:
    2 Bales dried Meat (ea. 90 lbs)
    1 Bag common Pemican (90 lbs)
    3 lbs Grease
Aug. 31, 1863:
    20 Nails 9 in.
    50 Nails 6 1/2 in.
    2 sets Byre Door Mountings
    2 sets Kitchen Door Mountings
    2 sets House Door Mountings
    2 prs Store Door Hinges
    1 1/2 doz. window Hinges
    1 Saw Set
    4 Window Sashes (ea 9 panes)
    250 Shingling Nails
    9 squares Window Glass
Sept. 10, 1863: The following for boat's crew
    1 Bag common Pemican (90 lbs)
    1 Bale dried Meat
    4 lbs Grease
    20 lbs dried Meat for Mrs. Dumas

ACCOUNT BOOK 1864-65 (B.56/d/12)

Dunvegan debit to Fort Chipewyan for the following supplies
May 17, 1864:
40 lbs dried Meat
15 lbs com. Pemican
Sept. ?, 1864:
45 lbs dried Meat
45 lbs com. Pemican
Sept. 22, 1864: To the following Supplies for Boat Crew and Passengers
2 Bags com. Pemican
1 Bales dried Meat 90 lbs
25 lbs fine Pemican
25 lbs dried Meat
8 lbs Grease
15 reindeer Tongues
6 Geese
2 Bushels Potatoes

Dunvegan debit to Fort St. Johns for the following supplies
May 1, 1864:
4 Bales dried Meat 100 lbs ea.
May 13, 1864: The following per Raft men
15 lbs dried Meat
20 lbs fresh Meat
2 large dressed Moose deer Skins
3 large dressed Rein deer Skins

Dunvegan debit to Saskatchewan District for the following supplies
June 1, 1864:
1 Bag Ball Shot
1 Keg Gunpowder
3 Packs Buffaloe Robes= 30 Robes
2 Packs Parfleches = 20 Parfleches

Dunvegan debit to Fort Vermilon for the following supplies
Oct. 8, 1864:
2 bags com. Pemican, 90 lbs ea.
2 Bales dried Meat 90 lbs ea.
3 Kegs Potatoes
2 Kegs Turnips
5 lbs Grease
200 lbs fresh Meat
3 full grown Dogs
50 lbs dried Meat for families
68 lbs fresh Meat for Mr. Dunlop
50 lbs dried Meat
10 lbs Butter

APPENDIX B

Recovered Faunal Remains from Fort Dunvegan
1982 and 1987 Surface Collection

	Alces alces			*Bison bison*			*Bos taurus*			*Bison* or *Bos*			*Cervus elaphus*			*Equus caballus*			*Odocoileus hemionus*			*Odocoileus sp.*		
	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I
Cranium																		1						
Teeth Lower			1															1						
Upper																								
Incisor																								
Fr																								
Maxilla																								
Mandible	1																							
Vertebra: atlas																								
axis																								
cervical			2																					
thoracic																								
lumbar			1																					
sacral												1			1									
caudal																								
?																								
Rib																								
Sternum																								
Scapula C																								
Fr	2	4	1					2		3														

		Alces alces			*Bison bison*			*Bos taurus*			*Bison or Bos*			*Cervus elaphus*			*Equus caballus*			*Odocoileus hemionus*			*Odocoileus sp.*		
		L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I
Humerus	**C**																								
	P																								
	D	7	7														1							1	
	Fr	1	2																						
Radius	**C**																								
	P	3	2		2	1																			
	D		3			1																			
	Fr															1									
Ulna	**C**																								
	P	3	3		1	1								1											
	D														1										
	Fr	1																							
Carpal:																									
scaphoid		5	2												1										
lunate		1	1																						
pisiform			1																						
magnum			1																						
unciform		1																							
scapholunar																									
trapezoid																									
trapezium																									
cuneiform		3																							
?																									

	Alces alces			*Bison bison*			*Bos taurus*			*Bison* or *Bos*			*Cervus elaphus*			*Equus caballus*			*Odocoileus hemionus*			*Odocoileus sp.*		
	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I
Pelvis C																								
Fr	6	3											3	1					1					
Femur C																								
P	2												1											
D		1																						
Fr				1										1										
Patella C		1																						
Fr	1										1													
Tibia C																								
P	1	1																						
D		1		1															2					
Fr	1							1																
Fibula C																								
Fr																								
Tarsal:																								
astragalus	2	2												1					1					
calcaneus	2	2					1						1	2			1		1					
cuboid																								
navicular																								
lat. malleolus	3	2												2										
nav. cuboid	1																							
fourth tarsal																1	2							

	Alces alces			*Bison bison*			*Bos taurus*			*Bison* or *Bos*			*Cervus elaphus*			*Equus caballus*			*Odocoileus hemionus*			*Odocoileus sp.*		
	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I
Metacarpal: 1st			3												1				1	1				
2nd																								
3rd																								
4th																	1							
5th																								
?																								
Metatarsal: 1st						1								1										
2nd																								
3rd																								
4th																1								
5th																								
?																								
Metapodial																								
Phalanx: 1st			3			2									1			1						
2nd			4			1													1					
3rd															1									
?																								
Cuneiform	1	3												1										
Prox. sesamoid			1																					1
Distal sesamoid																								
NISP	106			12			4			5			22			8			8			2		

		Ursus sp.			*Ursus americanus*			*Ursus arctos*			*Gulo gulo*			*Canis latrans*			*Canis* sp.			*Castor canadensis*			*Lynx canadensis*		
		L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I
Cranium					1		1														1	2			
Teeth	Lower																		1			4	1	1	
	Upper																								
	Incisor																		2			6			
	Fr			2			1												2			19	1		1
Maxilla					1	1											2			2				1	
Mandible						1						1					1	1		5	4			1	1
Vertebra:	atlas												1									1			
	axis																								
	cervical																								
	thoracic																								
	lumbar																					1			
	sacral																					1			
	caudal																					2			
	?												1									4			
Rib																				1					
Sternum																									
Scapula	C																								
	Fr																			2	2				

		Ursus sp.			*Ursus americanus*			*Ursus arctos*			*Gulo gulo*			*Canis latrans*			*Canis* sp.			*Castor canadensis*			*Lynx canadensis*		
		L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I
Humerus	C																								
	P																				4				
	D																	1		4	5				
	Fr																				1			1	
Radius	C																								
	P																			1	4	1		1	
	D					1									1										
	Fr																								
Ulna	C																								
	P				1	1						1								3	2				
	D																								
	Fr																				2				
Carpal:																									
scaphoid																									
lunate																									
pisiform											1	1													1
magnum																									
unciform						1																			
scapholunar																									
trapezoid																									
trapezium																									
cuneiform																									
?																						1			

		Ursus sp.			*Ursus americanus*			*Ursus arctos*			*Gulo gulo*			*Canis latrans*			*Canis sp.*			*Castor canadensis*			*Lynx canadensis*		
		L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I
Pelvis	C																								
	Fr																			5	2	1			
Femur	C																								
	P																				1	1			
	D																			1					
	Fr																			2	2				
Patella	C																							1	
	Fr				1																				
Tibia	C																								
	P																				1				
	D																					1			
	Fr																				1				
Fibula	C																								
	Fr																								
Tarsal:																									
astragalus																							1		
calcaneus																				1					
cuboid																									
navicular																									
lat. malleolus																									
nav. cuboid																									
fourth tarsal																									

	Ursus sp.			*Ursus americanus*			*Ursus arctos*			*Gulo gulo*			*Canis latrans*			*Canis sp.*			*Castor canadensis*			*Lynx canadensis*		
	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I
Metacarpal: 1st				1																				
2nd																								
3rd												1												
4th																	1							
5th																								
?																								1
Metatarsal: 1st				1																1				
2nd																								
3rd																								
4th				1																				
5th																								
?						1																		
Metapodial			1									1						1						
Phalanx: 1st			1									2						1			3			3
2nd			2			4																		1
3rd			1			1															1			2
?												1												
Cuneiform																								
Prox. sesamoid																								
Distal sesamoid																								
NISP	7			20			1			11			1			13			110			19		

		Martes americana			*Lontra Canadensis*			*Vulpes vulpes*			*Ondatra zibethicus*			*Lepus americanus*			*Glaucomys sabrinus*			*Microtus* sp.		
		L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I
Cranium										1												1
Teeth	Lower							3														
	Upper																					
	Incisor																					
	Fr							1		2						2						
Maxilla								5	1						1							
Mandible		1	2					2						4	3		1			2	1	
Vertebra:	atlas																					
	axis																					
	cervical																					
	thoracic															1						
	lumbar																					
	sacral																					
	caudal																					
	?									1												
Rib																2						
Sternum																						
Scapula	C																					
	Fr													4	4	3				1	1	

		Martes americana			*Lontra Canadensis*			*Vulpes vulpes*			*Ondatra zibethicus*			*Lepus americanus*			*Glaucomys sabrinus*			*Microtus* sp.		
		L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I
Humerus	C																					
	P								1						2							
	D													6	4							
	Fr																					
Radius	C																					
	P													2	2							
	D														1							
	Fr																					
Ulna	C																					
	P													3	6							
	D									1												
	Fr													1		1						
Carpal:																						
scaphoid																						
lunate																						
pisiform																						
magnum																						
unciform																						
scapholunar																						
trapezoid																						
trapezium																						
cuneiform																						
?																						

		Martes americana			*Lontra Canadensis*			*Vulpes vulpes*			*Ondatra zibethicus*			*Lepus americanus*			*Glaucomys sabrinus*			*Microtus sp.*		
		L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I
Pelvis	C																					
	Fr													5	4	1				1	1	
Femur	C																			1	1	
	P													5	4							
	D													1	9							
	Fr																					
Patella	C																					
	Fr																					
Tibia	C																			1	1	
	P													2	1							
	D										1			3	2	1						
	Fr																					
Fibula	C																					
	Fr																					
Tarsal:																						
astragalus								1	1							2						
calcaneus														3	4	1						
cuboid																						
navicular																						
lat. malleolus																						
nav. cuboid																						
fourth tarsal																						

	Martes americana			*Lontra Canadensis*			*Vulpes vulpes*			*Ondatra zibethicus*			*Lepus americanus*			*Glaucomys sabrinus*			*Microtus* sp.		
	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I
Metacarpal: 1st																					
2nd																					
3rd																					
4th																					
5th																					
?																					
Metatarsal: 1st																					
2nd																					
3rd																					
4th														1							
5th																					
?			1						2												
Metapodial																					
Phalanx: 1st									3												
2nd									1												
3rd									1												
?																					
Cuneiform																					
Prox. sesamoid																					
Distal sesamoid																					
NISP	4			1			27			1			101			1			12		

		Anas sp.			*Anas platyrhynchos*			*Anatinae* sp.			*Branata canadensis*			*Circus cyaneus*			*Grus* sp.			*Mareca americana*			*Pedioecetes phasianellus*		
		L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I
Cranium - bill				1				1									1								
Mandible																									
Sternum																						1			1
Furculum																									
Scapula	C																								
	Fr			1	1																				
Coracoid	C																								
	P		1																						
	D	1																							
	Fr	1	1									1													
Humerus	C																								
	P	3																							
	D			1							1				1									1	
	Fr																								
Radius	C																								
	P																								
	D																								
	Fr																								
Ulna	C																								
	P		1																						
	D	1																							
	Fr	1																							

		Anas sp.			*Anas platyrhynchos*			*Anatinae* sp.			*Branata canadensis*			*Circus cyaneus*			*Grus* sp.			*Mareca americana*			*Pedioecetes phasianellus*		
		L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I	L	R	I
Carpometacarpus																									
	C																								
	P																								
	D			1																					
	Fr			1																					
Phalanx	C																								
	Fr			1																					
Pelvis	C																								
	Fr																								
Femur	C																								
	P																								
	D																								
	Fr																								
Tibiotarsus	C																								
	P					1																			
	D																								
	Fr																								
Tarsometatarsus																									
	C																								
	P																								
	D																								
	Fr																								
NISP		13			1			1			2			1			1			1			2		

		Spatula clypeata			*Tetraonidae* sp.		
		L	R	I	L	R	I
Cranium - bill							1
Mandible							
Sternum							
Furculum							
Scapula	C						
	Fr						
Coracoid	C						
	P						
	D						
	Fr						
Humerus	C						
	P						
	D	1					
	Fr						
Radius	C						
	P						
	D						
	Fr						
Ulna	C						
	P				1		
	D					2	
	Fr						

		Spatula clypeata	*Tetraonidae* sp.
		L R I	L R I
Carpometacarpus			
	C		
	P		
	D		
	Fr		
Phalanx	C		
	Fr		
Pelvis	C		
	Fr		
Femur	C		
	P		
	D		
	Fr		
Tibiotarsus	C		
	P		
	D		
	Fr		
Tarsometatarsus			
	C		
	P		
	D		
	Fr		
NISP		1	4